

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES 1 3	
2. AMENDMENT/MODIFICATION NO. 0015		3. EFFECTIVE DATE 17 Feb 2004		4. REQUISITION/PURCHASE REQ. NO. W25PHS31710862		5. PROJECT NO. (If applicable)	
6. ISSUED BY US Army Engineers, Philadelphia Wanamaker Building, 100 Penn Square East Contracts Branch, Room 643 Philadelphia, Pennsylvania 19107-3390		CODE		7. ADMINISTERED BY (If other than Item 6) US Army Engineers, Philadelphia Wanamaker Building, 100 Penn Square East Philadelphia, Pennsylvania 19107-3390 Jennifer McGivern, Contracts Branch 215-656-6773		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(√)	9A. AMENDMENT OF SOLICITATION NO. DACA61-03-R-0009		
				×	9B. DATED (SEE ITEM 11) 07 July 2003		
					10A. MODIFICATION OF CONTRACTS/ORDER NO.		
					10B. DATED (SEE ITEM 13)		
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

DESIGN/BUILD AIR FREIGHT TERMINAL FACILITY, DOVER AIR FORCE BASE, DELAWARE, STEP (PHASE) TWO

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

THIS AMENDMENT DOES NOT EXTEND THE STEP (PHASE) TWO PROPOSAL DUE OF 05 MARCH 2004 at 1:00 PM.

(CONTINUED ON NEXT PAGE)

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR		16B. UNITED STATES OF AMERICA	
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	
15C. DATE SIGNED		16C. DATE SIGNED	

14. DESCRIPTION OF AMENDMENT (continued)

a. SECTION 00010 - SUPPLIES OR SERVICES AND PRICES: Delete Section 00010 in its entirety and substitute revised Section 00010 annotated Amendment No. 0015 attached hereto.

b. SPECIFICATIONS

1) Section 01010 - Delete Part I - Program Summary in its entirety and substitute revised Part I annotated Amendment No. 0015 attached hereto.

2) Section 01010 - Delete Part III - Facility Performance in its entirety and substitute revised Part III annotated Amendment No. 0015 attached hereto.

3) Section 01010 - Delete the following Chapters in their entirety and substitute revised Chapters annotated Amendment No. 0015 attached hereto.

- a) Chapter A (6 pages)
- b) Chapter A1 (3 pages)
- c) Chapter A13 (4 pages)
- d) Chapter B (13 pages)
- e) Chapter B1 (5 pages)
- f) Chapter C14 (3 pages)
- g) Chapter C16 (5 pages)
- h) Chapter C17A (4 pages)
- i) Chapter C17B (3 pages)
- j) Chapter C18 (2 pages)
- k) Chapter C19 (2 pages)
- l) Chapter D (8 pages)
- m) Chapter D2 (5 pages)
- n) Chapter D21 (2 pages)
- o) Chapter D22 (4 pages)
- p) Chapter D23 (4 pages)
- q) Chapter D24 (4 pages)
- r) Chapter D25 (3 pages)
- s) Chapter D3 (4 pages)
- t) Chapter D31 (4 pages)
- u) Chapter D33 (2 pages)
- v) Chapter D34 (7 pages)
- w) Chapter D35 (3 pages)
- x) Chapter D36 (4 pages)
- y) Chapter D39 (1 page)
- z) Chapter D41 (2 pages)
- aa) Chapter D43 (4 pages)
- bb) Chapter D5 (3 pages)
- cc) Chapter D51 (3 pages)
- dd) Chapter D53 (2 pages)
- ee) Chapter D7 (2 pages)
- ff) Chapter D71 (6 pages)
- gg) Chapter G3 (3 pages)

4) Appendix I - Delete the following pages in their entirety and substitute the revised pages annotated Amendment No. 0015 attached hereto:

- a) A-1, A-7, M-2, M-12, P-2, P-10, P-12, P-15, E-2, E-15

5) Appendix M - Delete Attachment 1 in its entirety and substitute revised Attachment 1 annotated Amendment No. 0015 attached hereto.

6) Appendix M - Delete Attachment 2 in its entirety and substitute revised Attachment 2 annotated Amendment No. 0015 attached hereto.

c. DRAWINGS

1) Drawing A1.01 - Delete this drawing in its entirety and substitute Drawing A1.01, annotated Amendment 0015, attached hereto.

2) Make the following pen and ink change to Drawing C-2.1: Add the following at the end of Note No.1: "Ponding occurs throughout the paved areas, particularly in the area of the existing flight line side loading docks, due mostly to unequal settlement. It should not be assumed, based on the drawings provided in this RFP that the area drains properly."

3) Add the Reference Drawing Sheet 80 of 97 entitled "Lighting Plan, Ground Floor - Sheet #2", dated 5/12/71 for the existing Air Freight Terminal, Building 505 annotated Amendment No. 0015 attached hereto.

4) Add the Reference Drawing Sheet 3 of 4 entitled "Existing and New Sections and Details" for the existing Aircraft Wash Rack, Facility 66223 annotated Amendment No. 0015 attached hereto.

d. Please indicate receipt of this amendment on Standard Form 1442 (SOLICITATION, OFFER, AND AWARD) as Amendment No. 0015. Failure to acknowledge all amendments may be cause for rejection of the proposal.

SECTION 00010 – SUPPLIES OR SERVICES AND PRICES

PRICE SCHEDULE

Item No.	Description	Qty	Unit Price	Amount
BASE				
BID				
0001	All costs in connection with design and design reviews related to the Air Freight Terminal and related design of demolition work, Dover AFB, DE, complete as shown on drawings and as specified except as noted below for items 0001A, 0001B and 0001C. This item includes the design of the common heating and cooling system for the Defense Courier Service, Freight Transfer Facility (FTF) and Cargo Development Facility (CDF).	N/A	LS	\$_____
0001A	All costs in connection with design and design reviews related to the MMHS in the main AFT building.	N/A	LS	\$_____
0001B	All costs in connection with the design and design reviews related to the MMHS in the Outsized Cargo Facility.	N/A	LS	\$_____
0001C	All costs in connection with the design and design reviews related to the Defense Courier Service (DCS) Facility except for shared facilities listed in bid item 0001.	N/A	LS	\$_____
0002	All costs in connection with construction of the Air Freight Terminal, including utilities to points 5 feet outside of the building lines complete as shown on drawings and as specified, except for items 0002A, 0002B, 0003, 0003A, 0004, 0005, 0006, 0007, 0008, 0009, 0010, 0010A, 0010B, 0010C, 0011, 0012, 0013, 0014, 0015, 00016, and 0017.	N/A	LS	\$_____
0002A	All costs in connection with purchase and installation of dock levelers, as shown on drawing A1.01 (Appendix J).	24	\$_____	\$_____
0002B	All costs in connection with purchase and installation of truck levelers, as shown on drawing A1.01 (Appendix J).	2	\$_____	\$_____
0003	All costs in connection with construction of all utilities			

Item No.	Description	Qty	Unit Price	Amount
	beyond points 5 feet outside the building lines, except for communications (see Note below) (except that the underground conduit for communications is part of this bid item) and all site work complete as shown on drawings and as specified, except for items 0004, 0005, 0006, 0007, 0008, 0009, 0009A, 0009B, 0010, 0011, 0011A, 0011B, 0012, 0013, 0014, 0015, 0016, and 0017.	N/A	LS	\$_____
0003A	All costs in connection with purchase and installation of truck levelers for concrete rolling stock loading ramp, as shown n drawing A1.03 (Appendix J).	2	\$_____	\$_____
0004	All costs in connection with purchase, haul and placement of satisfactory structural fill for the main Air Freight Terminal building which includes fill for bid items 0002, 0002B, 0003, 0003A, and 0006.	N/A	LS	\$_____
0005	All costs in connection with removal and disposal of structurally unsatisfactory excavated soil which also includes unsatisfactory soil from bid items 0002, 0002B, 0003, 0003A, and 0006.	N/A	LS	\$_____
0006	Installation of emergency generator.	N/A	LS	\$_____
0007	Demolition of existing buildings and facilities outlined below, except for Item 0008.			
0007A	Demolition of existing Building 504	N/A	LS	\$_____
0007B	Demolition of existing Building 505, Bay 0 and northern section of the Pallet Storage and Racking System and east covered Staging Area	N/A	LS	\$_____
0007C	Demolition of existing Building 510	N/A	LS	\$_____
0007D	Demolition of existing Building 581	N/A	LS	\$_____
0007E	Demolition of existing Building 582	N/A	LS	\$_____
0007F	Demolition of existing Building 583	N/A	LS	\$_____
0007G	Demolition of existing Building 585	N/A	LS	\$_____

Item No.	Description	Qty	Unit Price	Amount
0007H	Demolition of existing Facility 66223	N/A	LS	\$_____
0007I	Demolition of existing Facility 67585	N/A	LS	\$_____
0007J	Demolition of existing Facility 506	N/A	LS	\$_____
0007K	Demolition of existing Facility 521, to include in ground truck scale	N/A	LS	\$_____
0008	Asbestos Abatement			
0008A	Building 504	N/A	LS	\$_____
0008B	Building 510	N/A	LS	\$_____
0008C	Building 582	N/A	N/A	\$_____
0008D	Building 583	N/A	LS	\$_____
TOTAL BASE BID AMOUNT				\$_____

OPTIONS

OPTION #1

0009	All costs in connection with purchase and installation of 2 automated elevated transfer vehicles (ETVs), the ETV storage enclosure, and the storage conveyors, Item no. 0010 includes the roofs, stairs, exterior shells, and the overhead doors for the ETV enclosure. The foundation costs for the following: ETV storage enclosure, ETV storage racks and rail shall be included in bid item 0002.	N/A	LS	\$_____
0009A	All costs in connection with purchase and installation of the staging dock conveyors. The costs for the canopies and foundations associated with the staging dock conveyors shall be included in bid item 0002.	N/A	LS	\$_____
0009B	All costs in connection with purchase and installation of the lifts, the lift conveyors, the lift transfer conveyors, the ALOC/Code J conveyors, the ball transfer conveyor system, and the sortation conveyor system. The costs for the lift pits, and the canopy and foundations associated			

Item No.	Description	Qty	Unit Price	Amount
	with the ALOC/Code J conveyors shall be included in bid item 0002.	N/A	LS	\$_____
00010	All costs in connection with construction of the Outsized Cargo Facility, including the FTF and CDF, common HVAC plant/mechanical room for the FTF, CDF, and DCS; and associated utilities to points 5 feet outside the building lines complete as shown on the drawings and as specified, except for new fill – see item 0012, and disposal of unsatisfactory soil – see item 0013, and except for items 0010A, 0011, 0016, and 0017.	N/A	LS	\$_____
0010A	All costs in connection with purchase and installation of truck levelers, as shown on drawing A1.03 (Appendix J).	2	\$_____	\$_____
0011	All costs in connection with construction of all utilities, associated with the Outsized Cargo Facilities, beyond points 5 feet outside the building lines, except for communications (see Note below) and all site work complete as shown on drawings and as specified and except for new fill – see item 0012, and disposal of unsatisfactory soil – see item 0013.	N/A	LS	\$_____
0012	All costs in connection with purchase, haul, and placement of satisfactory structural fill for the outsized cargo facility, FTF, DCS, and CDF which includes fill for bid items 0010, 0010A, 0011, and 0016.	N/A	LS	\$_____
0013	All costs in connection with removal and disposal of structurally unsatisfactory excavated soil for the outsized cargo facility, FTF, DSC, and CDF which includes unsatisfactory fill for bid items 0010, 0010A, 0011, and 0016.	N/A	LS	\$_____
0014	Demolition of Building 505, Bays 1, 2, 3, 4, 5, associated covered storage areas adjacent to bays on the flight line side of the building, exterior overhead crane to include supporting structure, exterior loading ramp, and the Administrative Area on the truck side of the building.	N/A	LS	\$_____
0015	Asbestos Abatement, Building 505 Admin Area	N/A	LS	\$_____
TOTAL FOR OPTION #1				

OPTION
#2

Item No.	Description	Qty	Unit Price	Amount
0016	All costs, except as noted in items 0010, 0012, and 0013 for the construction of the DCS, and associated utilities to points 5 feet outside the building lines complete as shown on the drawings and as specified.	N/A	LS	\$_____
0017	All costs in connection with purchase and installation of the multi-pallet ETV (MPETV), the multi-pallet storage conveyors, the multi-pallet build-up conveyors, motorized pallet conveyor from FTF and DCS, and the 2 overhead bridge cranes. The costs for the supporting structure for the bridge cranes, the overhead canopy, and the dock/foundation for the oversized cargo area, including the MPETV storage racks and rails, shall be included under bid item 0010.	N/A	LS	\$_____
TOTAL FOR OPTION #2				
OPTION #3				
0018	Emergency Generator, less installation.	N/A	LS	\$_____

NOTES:

Government will provide communications lines from nearest tie-in to the building. Communications lines will be in AFT contractor furnished buried conduits.

For the DCS, this RFP includes a complete design for a separate structure. The contractor's designer shall use this as a basis for re-design of the DCS as part of a combined structure: Outsized Cargo Facility, FTF, DCS, and Cargo Development Facility (CDF). However, due to the secure nature of the FTF and DCS functions these two facilities will not share toilet and break room facilities, nor with the Outsized Cargo Facility and the Cargo Development Facility (CDF). However, a common heating and cooling system shall serve the DCS, FTF and CDF.

The Army will procure this facility through a selection process in accordance with the provisions set forth in this Request for Proposal (RFP). When a contract is awarded, it will be a "Firm Fixed Price Contract."

The Congress, in authorizing and funding this contract, has established certain cost limitations for the project. The current estimated limit for the complete design and construction of this project, less the automated and mechanized material handling systems, is \$50,000,000. Total includes applicable Option No. 2 bid items And Option

No. 3.. The current estimated limit for the automated and mechanized material handling systems (total for Items 0009, 0009A, 0009B and 0011B) is \$20,000,000. There are no expectations of additional funding. Proposals that exceed this funding limit after evaluating the options may be rejected. Submission of desirable alternative features exceeding the minimum requirements may be considered as long as award can be made with the established funds.

For the DCS, the total cost limit for the design and construction is \$1,320,000.

Any proposal that is materially unbalanced as to prices may be rejected. An unbalanced proposal is one which is based on prices significantly less than the cost for some work and prices which are significantly overstated for other work and can also exist where only overpricing or under pricing exists. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

Failure to insert prices for each item, to include bid options in the bid schedule may cause the proposal to be rejected.

PROGRAM SUMMARY

A. Background:

1. The U.S. Army Corps of Engineers, Philadelphia District (CENAP) has been requested by the Air Mobility Command (AMC), U.S. Air Force to procure a design-build contract and perform design and construction oversight for a new Air Freight Terminal (AFT) at Dover AFB. The existing AFT was severely damaged due to heavy snow in February 2003, is old (circa 1950), and cannot be economically upgraded to meet the current and future needs of the Air Mobility Command (AMC). The existing facility must remain in operation during the construction of the new AFT; therefore, the design shall address a sequence of construction approach to provide efficient operation of the facility from minimal activity to peak activity. Most utilities enter the existing Air Freight Terminal under or near Bay 0, which is the first Bay to be demolished. Prior to demolition of Bay 0 the contractor shall provide for temporary utility service, from contractor selected and Government approved tie in points to the existing Base utility lines or via contractor furnished temporary utility services, to the remainder of the existing Air Freight Terminal until vacated by the Air Force at the time that the new Air Freight Terminal is complete. Initial sequence of work shall include the administration areas, import/export bays, hazardous materials storage, ALOC/Code "J" dock, supporting Mechanized Material Handling System (MMHS) and utilities, demolition of existing buildings indicated on site plans and demolition of Bay O of the existing AFT (Building 505) along with the associated covered loading docks on the flight line side. Once the above work is complete and the Air Force moves operations out of the existing AFT (into the new AFT and selected temporary facilities), demolition of remainder of existing AFT and complete construction of new AFT, which includes the outsized cargo, freight transfer, defense courier service, and cargo deployment facilities shall be performed. A design-build approach via unrestricted advertisement was selected in terms of completing design and construction.

B. Basic Function:

1. This project includes the design and construction of a new 371,490 SF Air Freight Terminal (AFT) at Dover Air Force Base (AFB) which consists of the following. The above square footage includes the options outlined in paragraphs B.3 and B.4, below.

a. Cargo processing bays, including refrigerated storage area and packing and crating area. **The contractor shall minimize the number of structural columns in the cargo processing bays to give the greatest possible distance between structural columns to allow maximum space for fork lifts to maneuver.**

b. Operations center and administrative space.

c. Covered storage.

d. Special Handling Area for hazardous materials storage.

e. Truck parking areas and traffic lanes (partly on existing pavement).

- f. K loader traffic lanes and marshalling yard (partly on existing pavement).
- g. Structure shall be steel frame with reinforced concrete foundation, concrete floor slab (portions at grade and portions elevated for tractor-trailers), masonry and metal siding exterior walls, finishes and sloped standing seam metal roof.
- h. Truck dock equipment (truck and dock levelers).
- i. Privately Owned Vehicle (POV) parking areas, driveways, pedestrian access to facilities, AT/FT barriers (curb and post tension cables for security), truck guard house/check-in area, deceleration lane, etc. See Concept Site Plan for more information.

2. Project also includes:

- a. Demolition of Outdoor Aircraft Wash Rack (Facility #66223). Construction of a new facility between Buildings 706 and 711 using "as built" of the original facility.
- b. Demolition of the existing Oil/water Separator and Lift Station (1,430 sf) (Facility #583). Construction of a new facility at a new site North of Hangar 706. New facility shall have same capacity as #583, but shall be designed and constructed to meet all codes. It takes approximately 20,000 gallons of water to wash a single C-5 aircraft. Approximately 150 C-5 aircraft are washed each year.
- c. Demolition of the existing Marshalling Yard Facility (1,216 sf) (Facility # 581). This function shall be incorporated into the new AFT. This function in the new AFT is renamed as Cargo Development Facility.
- d. Demolition of the existing Mobility Processing Facility (40,855 sf) (Facility #582), including the modular buildings housed inside the facility.
- e. Demolition of the existing C-5 Parts Store (7,289 sf) (Facility #585) Building's function to be re-located to Building Number 515 by others.
- f. Demolition of the existing Ramp Services Office (1,830 sf) (Facility #506). This function shall be incorporated into new AFT.
- g. Demolition of the existing Fire Station (15,645 sf) (Facility #510).
- h. Demolition of the existing vacant Storage Facility (436 sf) (Facility #504).
- i. Demolition of the existing pavilion (Facility #67585). Construction of a new facility at a new site, similar in design to the existing pavilion, shall be performed by others.
- j. Demolition of the existing Air Freight Terminal (398,317 sf) (Facility #505). This facility shall be demolished in phases as outlined in Part I, paragraph A.1 of this Section 01010. The demolition also includes the existing ETVs and racking and conveying systems, modular trailer buildings, and the existing 10 ton and 35 ton bridge cranes. Demolition of Bays 1-5 shall be an option. See paragraphs B.4, below.

- k. Relocation of existing utilities, to remain, as needed. Specifically there is a 24 inch storm sewer line under the site of the new AFT. This line shall be relocated as necessary so as not to pass under the new AFT. Base policy is that utilities do not run under buildings.
- l. Demolition of the existing Building 521 to include the in ground truck weigh scale.**
- m. Relocation of the existing Building 507 with gas tank and pump to the south of Building 509.**

3. The furnish and installation of the Mechanized Material Handling System (MMHS), also referred to as the Air Cargo Handling System, are options to the Contract. Refer to the Price Schedule in Section 00010.

- a) Two (2) manless elevating transfer vehicles (ETV),
- b) Four (4) level pallet storage system, including the exterior enclosure.
- c) Multi-pallet ETV with two (2) level multi-pallet train storage system,
- d) Staging dock conveyers,
- e) Pallet lifts with scales.
- f) Powered and gravity roller conveyor systems,
- g) One (1) 35 ton bridge crane, and one (1) 10 ton crane, and
- h) Small package conveyor line.

4. The construction of the Outsized Cargo Facility, along with Cargo Deployment, Freight Transfer and Defense Courier Service (DCS) Facilities is an option(s) to the contract. Refer to Price Schedules in Section 00010.

a. DCS design drawings and scope are located in Appendices K and M, respectively. The documents in these appendices were prepared for a stand-alone building. The DCS facility shall be consolidated as one structure with the Outsized Cargo, Cargo Deployment and Freight Transfer Facilities, as shown on Drawing A1.03 in Appendix J of this RFP.

C. SPACES

1. Interior Spaces: The project includes spaces of the following types:

- a. Cargo Processing
- b. Sensitive Compartmented Information Facilities (SCIF): Two separate SCIFs are used to build pallets, one in the Freight Transfer Facility (FTF) and one in the Defense Courier Service Facility (DCS). In addition, the FTF requires an administrative SCIF where classified communications equipment is operated. The DCS SCIF design

criteria is attached as Appendix M of this RFP, along with reference drawings for a stand-alone DCS facility in Appendix K. FTF SCIF design criteria is specified in Section 01010 – Chapter C-17A. There is also SCIF Room in the Special Handling Area. This criteria is specified in Section 01010 – Chapter C17B.

- c. Hazardous materials storage area.
- d. Air Terminal Operations and Administrative space
- e. Occupant Services: Spaces for toilets, eating, and resting (lounges).
- f. Storage: Rooms devoted to storage, including closets, and storage rooms.
- g. Circulation: Spaces functioning as corridors, stairs, and ramps.
- h. Building Services: Spaces for service sinks, and maintenance equipment.
- i. Utility Equipment: Spaces for mechanical equipment, electrical equipment, communications equipment (shall have separate HVAC controls to allow for heating and cooling year round), elevator equipment, and centralized heating, ventilating, air-conditioning and exhaust equipment and controls and space for heating and cooling.

2. Exterior Spaces:

- a. Covered Storage Area
- b. Outdoor Building Services: Spaces for trash collection, trash removal, maintenance equipment storage, and delivery and loading.
- c. Outdoor Utility Equipment: Dedicated spaces for outdoor elements of water and drainage, heating and cooling, fire protection, electrical power, and telecommunications services.
- d. Automotive: Spaces for access roads and truck parking.

D. PROGRAM

1. Project Program: The project program is described in Section 01010 Part II. Refer to supplemental design drawings in appendix J. The drawings are intended to serve as a partial guideline to convey the design intent for some functional relationships.

E. EXISTING CONDITIONS

- 1. The project site is currently partly vacant with some buildings and other structures to include a portion of the existing AFT.
 - a. Existing structures are to be completely removed.
 - b. See the Program Summary, above for description of replacement structures required.

- c. Required demolition: see Program Summary, above
- d. See Chapter G for removal of site structures and other features.
- e. Structures or features to be preserved include some vehicle parking/storage paved areas.
- f. Portions of the new AFT site are located over abandoned concrete with asphalt surface abandoned taxiways and runway. These pavements will be removed where necessary as part of the new AFT construction.

END OF PART I

FACILITY PERFORMANCE**A. PERFORMANCE****1. Basic Function:**

- a. Provide built elements and site modifications as required to fulfill needs described in the project program. Refer to UFC 1-200-01, Design: General Building Requirements which provides guidance for the use of model building codes for design and construction of this facility.
- b. Elements: The complete project comprises the following elements:
 - 1) Substructure (A): Elements below grade and in contact with the ground.
 - 2) Shell (B): The superstructure, exterior enclosure, and the roofing.
 - 3) Interiors (C): Interior construction, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.
 - 4) Services (D): Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.
 - 5) Equipment and Furnishings (E): Fixed and movable elements operated or used by occupants in the functioning of the project.
 - 6) Demolition (F): Removal of unneeded and undesirable existing elements.
 - 7) Site work (G): Modifications to the site, site improvements including landscaping, utilities, and separate pavilion structure (option).
- c. Code: The DB contractor shall retain a professional Fire Protection Engineer, familiar with DOD requirements, including UFC 3-600-1, to perform a project code analysis to determine the construction classification, occupancy group(s), travel distances, fire wall locations, fire suppression requirements, etc. Make all portions of the project comply with the code. The code referred to herein consists of all applicable local, State, and federal regulations, including those listed below:
 - 1) Federal Regulatory Requirements:

- a) Americans with Disabilities Act of 1990, as a public accommodation, as implemented in:
 - (i) 28 CFR 35, Department of Justice regulations relating to State and local governments, including ADAAG.
 - (ii) CFR 36, Department of Justice regulations, including ADAAG.
- 2) State of Delaware regulatory requirements, if more stringent than the following:
 - a) IBC, International Building Code, and Fire Code, latest edition.
 - b) NFPA 101, Safety to Life From Fire in Buildings and Structures, latest edition.
 - c) NFPA 70, National Electrical Code, latest edition.
- 3) Additional Regulatory Criteria Documents: In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Dover AFB.
 - a) NFPA 54 - National Fuel Gas Code
 - b) National Standard Plumbing Code, Illustrated, latest edition
 - c) ASHRAE Standard 62 - Ventilation for Acceptance Indoor Air Quality
 - d) ASHRAE Standard 15 - Safety Code for Mechanical Refrigeration
 - e) NFPA 10 - Portable Fire Extinguishers, latest edition
 - f) NFPA 13 - Sprinkler Systems Installation, latest edition
 - g) NFPA 72 - National Fire Alarm Code, latest edition
 - h) NFPA 30 – Flammable and Combustible Liquids

- i) NFPA 90A - Installation of Air Conditioning and Ventilating Systems, latest edition
 - j) NFPA 220 - Types of Building Construction, latest edition
 - k) NFPA 780 - Lightning Protection Code, latest edition
 - l) ASME A17.1
 - m) ASME A17.3
 - n) NAP-EIM - Engineering Instructions Manual (EIM), Philadelphia District, U.S. Army Corps of Engineers (** - see below)
 - o) ASTM E380-93
 - p) NEBB Procedural Standards, latest edition - Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
 - q) AABC MN-1, latest edition - National Standards for Testing and Balancing of Heating, Ventilating of Air Conditioning Systems.
 - r) Air Force Manual (AFM) 88-29 Engineering Weather Data
 - s) Chapter 11, Energy Conservation Criteria, Architectural and Engineering Instructions (AEI), Design Criteria, latest edition, US Army Corps of Engineers, Engineering Div., Directorate of Military Programs.
 - t) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc (ASHRAE) Guide and Data Handbooks, latest editions.
- 4) * UFC 3-600-01, Design: Fire Protection Engineering for Facilities (formerly MIL-HDBK 1008C) takes precedence over other fire or life safety codes where requirements conflict.
 - 5) UFC 4-021-01, Design and O&M: Mass Notification Systems.** Structural engineering requirements shall meet requirements of NAP-EIM.

- 6) UFC 4-010-01, Design: DoD Minimum Antiterrorism Standards for Buildings. Latest issue 8 October 2003 – http://65.204.17.188/report/doc_ufc.html
 - 7) ETL 1110-3-491: Sustainable Design for Military Facilities, May 1, 2001 including the "LEED Rating System"
 - 8) Occupancy: The primary occupancy of the project, according to the code, is Group Warehouse and Storage Facility. A secondary occupancy, according to the code, is Group U (Utility and Miscellaneous).
 - 9) Pest Control Services: See Paragraphs under heading entitled "4. Health and Safety" in this Part III.
- d. In addition to the requirements of this chapter, comply with requirements of PART I – Program Summary, and Section 01012 "DESIGN AFTER AWARD".
2. Amenity and Comfort:
- a. Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the following:
 - 1) Summer Interior Design Conditions, refer to HVAC Chapter D3 and the Appendices to this RFP:
 - 2) Winter Interior Design Conditions, refer to HVAC Chapter D3 and the Appendices to this RFP:
 - 3) Outside Air Design Conditions, refer to HVAC Chapter D3 and the Appendices to this RFP:
 - 4) Energy Design Wind Speed: For summer use 7.5 mph from the south and for winter use 19 mph from the north.
 - b. Sustainable Design: Design and construct the facility with a goal of a LEED Gold Rating.
3. Acoustical Performance: Design and construct an interior environment for proper acoustical performance. **Refer to the 'A' scale.**
- a. Exterior-to-Interior and Room-to-Room acoustical performance: Reference Appendices for the Requirements Document, Special

Requirements, Sound Attenuation section or as listed elsewhere in this RFP, whichever is a more stringent requirement.

- b. For all administration buildings, provide exterior construction capable of reducing the exterior aircraft noise level of ~~140~~ 100dB to ~~45~~ 55dB in the interior spaces. **The design-build team shall verify the exterior noise level at the proposed building site to record exterior sound level that will be used in the final design. The interior walls between the Administration Blocks and the Cargo Bays/ETV shall provide a noise level in the Administration Blocks of 55db. The design-build team shall obtain information from the MMHS equipment supplier concerning sound and vibration levels from the ETV in order to isolate the adjacent Administration Blocks from these disturbances.**
 - c. Acoustical design requirements for mechanical systems: no mechanical systems installed in this contract shall cause an NC level in occupied spaces exceeding recommended levels for working or utility spaces as listed in Chapter D34.
 - 1) Substantiation of acoustical design requirements for mechanical systems: Provide complete sound testing as required and prescribed by NEBB or AABC during testing, adjusting, balancing and commissioning of mechanical systems.
4. Health and Safety:
- a. Fire Resistance: Provide Type II-B minimum construction in accordance with IBC International Building Code.
 - b. Prevention of Accidental Injury: As required by code and as follows:
 - 1) Safety Glazing: As defined by 16 CFR 1201; provide in locations required by code, glazed areas subject to human impact, glazed areas at grade, doors, and other areas as needed.
 - 2) Other requirements specified in other Parts.
 - 3) Refer to requirements in other Chapters for anti-terrorism requirements for glazing.
 - 4) Substantiation:
 - a) Preliminary Design: Identification of building elements that require special accident prevention measures.

- b) Design Development: Identification of safety measures taken, detailed description of design criteria, and structural analysis of load-resisting elements prepared by licensed structural engineer.
 - c) Construction Documents: For load-resisting elements, structural design calculations and drawings sealed by licensed structural engineer.
- c. Health Hazards:
- 1) Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces.
 - 2) Hazardous Construction Materials: Design and construct to comply with the requirements of the code, plus see Chapter F for additional requirements relating to potentially hazardous materials in existing structures.
 - 3) Indoor Air Quality: Design and construct to comply with the following:
 - a) ANSI/ASHRAE 62-1989(Add.62a-90).
 - b) USAF ETL 03-02 (Mold Prevention)
 - 4) Substantiation:
 - a) Design Development: Identification of methods to be used to comply with requirements; ventilation design calculations and project construction document to show complete compliance with all aspects of the separate constant ventilation and exhaust systems as required by ETL 97-13. Identification of unusual indoor contaminants or sources and methods to mitigate their effects on occupants.
 - b) Construction Documents: Specifications showing that construction materials are not contaminant sources and do not adversely affect air quality.
 - c) Testing, Adjusting, Balancing and Commissioning: Field measured, documented reported outside and supply air quantities for each space and its associated air handler.

- d) Occupancy: Field-testing to show compliance, after full occupancy.
- d. Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.
 - 1) Definition of Elements at Ground Level: For purposes of physical security, any element within 6 m of the ground, grade, or adjacent paving.
 - 2) Security Zones:
 - a) Public Access Zone: That area to which the public has free access, including public corridors, grounds, and parking lots.
 - b) Reception Zone: The area to which the general public has access but beyond which access is restricted at all times.
 - c) Operations Zone: The area to which only employees and visitors with a legitimate reason to be there have access.
 - 3) See other Chapters for additional requirements.
 - a) Electrically Operated Equipment and Appliances: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.
- e. Pest Control Services: All contracted pest control services on Dover AFB property, regardless if pre or post construction, facility or grounds maintenance and preventative which require pesticide applications defined in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), shall be performed by a licensed/certified pesticide applicator. All pesticide applications shall be coordinated through the 436th Civil Engineer Squadron Pest Management Shop and approved by the Major Command (MAJCOM), Pest Management Consultant (PMC). Pesticide services shall meet the following minimum guidelines:
 - 1) The contractor shall prepare an Integrated Pest Management Plan (IPMP) for coordination through Dover's Pest Management Shop and approval from the MAJCOM, PMC.

- a) The IPMP shall incorporate the requirements listed in Department of Defense (DOD) Instruction (DODI) 4150.7, "DOD Pest Management Program" and Air Force Instruction (AFI) 32-1053, "Civil Engineering, Pest Management Program". The IPMP will comply with all federal, state, and local laws and regulations.
 - b) The IPMP should outline all pest, pesticides, pesticide applications methods, application equipment, to be used and controlled throughout the term of the contract.
 - c) The IPMP will include a copy of the material Safety Data Sheet (MSDS) and specimen label for all proposed pesticides to be used.
- 2) All pesticides used shall be identified on the "Armed Forces Pest Management Board (AFPMB) Standard Pesticides List Available to DOD Components and Agencies", or fully justified, in writing, as to why deviation from this list is necessary. Regardless, all deviations from the Armed Forces Pest Management Board's Approved Pesticide List shall receive MAJCOM, PMC approval, prior to their use on Dover AFB.
 - 3) The contractor shall provide the 436th Pest Management Shop application records no later than the 5th day of each month, for all applications made the month prior (e.g. 5 Nov, for applications made 1 – 31 Oct.).
 - a) Application records will include the location, targeted pest, pesticide name, EPA registration number, concentration used, total area treated, application method, application duration, total amount applied, applicators name, and applicators certificate number.

5. Structure:

- a. Environmental Loads: Environmental load allowance shall be as referenced in UFC-3-310-01 and in accordance with ASCE 7, latest edition, whichever is more stringent. Seismic load allowance shall be as referenced in T1 809-04, latest version. See sections A and B for additional requirements.
- b. Substantiation:

- 1) Proposal: Identification of major structural materials and systems.
- 2) Preliminary Design: Detailed listing of design criteria and preliminary analysis, prepared by a licensed structural engineer.
- 3) Construction Documents: Detailed design analysis by licensed structural engineer.

6. Durability:

- a. Expected Service Life Span: Expected functional service life of the built portions of this project is 50 years.
 - 1) Service life spans of individual elements that differ from the overall project life span are defined in other Chapters.
 - 2) Additional requirements for elements not required to have life span equal to that of the project as a whole are specified below under "Operation and Maintenance."
 - 3) Substantiation: Since actual service life cannot be proven, substantiation of actual service life is not required; however, the following are reasonable indicators of anticipatable service life:
 - a) Preliminary Design or Design Development: Service life expectancy analysis, for each element for which life span is specified; including:
 - (i) Length of effective service life, and aesthetic service life if specified, with action required at end; e.g. complete replacement, partial replacement, and refurbishment.
 - (ii) Basis of time estimates; e.g. proven-in-use application.
 - (iii) Basis of confidence in time estimates; e.g. similarity of present application to proven-in-use application.
 - (iv) Conditions under which estimate will be valid; e.g. expected uses, inspection frequency, maintenance frequency, etc.
 - b) Design Development: Replacement cost, in today's dollars, for each major element that has a service life expectancy less than that of the project; include both material and labor cost, but not

overhead or profit; base costs on installing in existing building, not as a new installation.

- c) Design Development: Life cycle cost of project, over the specified project service life, excluding operating staff costs; include costs of:
 - (i) Replacement of each element not expected to last the life of the project; identify the frequency of replacement.
 - (ii) Energy for operation of equipment and systems, from energy analysis specified under "Operation and Maintenance".
 - (iii) Routine maintenance of operating equipment, including replacement of worn parts before failure; identify frequency of maintenance.
 - (iv) Routine cleaning of exposed materials; identify type of cleaning and frequency.
 - (v) Deduct salvage value of replaced elements.
 - (vi) Calculate costs in today's dollars, disregarding the time value of money, inflation, taxes, and insurance.
- b. Animals: Do not use materials that are attractive to or edible by animals or birds.
 - 1) Insects: Do not use materials that are edible by insects, unless access by insects is prevented.

7. Operation and Maintenance:

- a. Space Efficiency: Minimize floor area required while providing specified spaces and space relationships, plus circulation and services areas required for functions.
- b. Energy Efficiency: Minimize energy consumption while providing function, amenity, and comfort specified.
 - 1) Provide energy efficient design using procedures and values using UFC 3-400-01 "Design Energy Conservation", procedures and values of UFC 3-400-02 "Engineering Weather Data". Computer Energy Systems Analysis (CESA) requirements shall include life

cycle cost equipment selection to evaluate ventilation system heat recovery and a complete and approved (by the Government) energy use budget compliance check/analysis. Please note that the cost of money, interest is not included in Government life cycle cost analyses.

2) Substantiation:

- a) ~~Proposal: Identification of method of calculation of energy efficiency to be employed and the proposal and design CESA. An RFP proposal Energy Use Budget (EUB) compliance check shall be compared with the maximum allowable "target" energy use budget number. The complete CESA shall be refined and finalized, submitted for review and modified until final approval during the D/B design phase.~~
- b) Design Development: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer. A finalized and approved CESA including all life cycle equipment selections and energy use budget compliance check/analysis. Provide an engineering analysis to show compliance with the maximum allowable U-factors for Building Envelope Components at Dover AFB. The Design/Build Contractor shall be required to purchase WinLCCID, latest version and use it for all Life Cycle Cost Analyses (LCCA) calculation and reporting. The current price of the program is approx. \$300.00 plus S&H. The program is available from the Blast Support Office, U of Illinois, Champagne/Urbana,

Webpage: <http://www.bso.uiuc.edu>, email: support@blast.bso.uiuc.edu, (217) 333-3977, FAX - (217) 244-6534.

Identification of method of calculation of energy efficiency to be employed and the proposal and design CESA.

- c) Design Development: Energy cost of all energy-consuming equipment and systems over the first year of operation; include analysis of probable change in annual cost over time due to aging but disregarding inflation and rate changes.
- d) Construction Documents: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer.

- e) Construction Documents: Energy cost of all energy-consuming equipment and systems over the first year of operation; include analysis of probable change in annual cost over time due to aging but disregarding inflation and rate changes.
- c. Water Consumption: Minimize water consumption.
- 1) Substantiation:
 - 2) ~~Proposal~~ Design Development : Estimated quantity of water that will be used in the first year of operation, divided into domestic water, HVAC water, and other water categories, with quantity of water recycled, if any; include basis of estimates.
- d. Waste (Trash/Rubbish) Removal: As described in the project program and as follows:
- 1) See Chapter E11 for requirements for solid waste disposal.
- e. Ease of Operation: Provide facility, equipment, and systems that are easily operated by personnel with a reasonable level of training for similar activities.
- 1) Minimize the need for specialized training in operation of specific equipment or systems; identify all equipment and systems for which the manufacturer recommends or provides training programs.
 - 2) Train Dover AFB's personnel in operation of equipment and systems; see Section 01701 "CONTRACT CLOSEOUT" for additional requirements.
 - 3) Substantiation:
 - a) ~~Proposal: Type of operating personnel and amount of training required; identification of each equipment item or system for which more than one day of training is required; identify source of data.~~
 - b) Design Development: Operating impact analysis, including identification of type and quantity of staff, tools, and supplies required; estimate of impact that aging materials will have on operating requirements; no cost calculations required; identify source of data.

Type of operating personnel and amount of training required; identification of each equipment item or system for which more than one day of training is required; identify source of data.

c) Construction Documents: Updated operating impact analysis, based on actual product selections.

f. Ease of Maintenance: Minimize the amount of maintenance required.

1) Substantiation:

a) Design Development: Maintenance impact analysis, including identification of maintenance effort (type of staff, time required, and frequency), tools, and supplies required, over expected functional and aesthetic service life of project; including preventive maintenance, replacement of parts, and cleaning, but not energy for operation or replacement at end of service life; no cost calculations required; identify source of data.

b) Design Development: Maintenance cost for first year of operation, based on use of maintenance contracts; estimate of the impact that aging materials will have on maintenance costs; description of maintenance activities included in estimated cost.

c) Construction Documents: Updated maintenance impact analysis, based on final product selections.

g. Ease of Repair: Elements that do not meet the specified requirements for ease of repair may be used, provided they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole; the service life expectancy analysis and life cycle cost substantiation specified for service life are provided; and Dover AFB' acceptance is granted.

h. Ease of Replacement: For elements not required to have the expected service life span equal to that specified for the project as a whole, make provisions for replacement without undue disruption of building operation.

B. Elements and Products:

1. In addition to requirements specified in other chapters, provide products and elements that comply with the following.
2. Where "no substitutions" is indicated, use only the product (or one of the products) specified.

3. Elements Made Up of More Than One Product:

- a. Where an element is specified by performance criteria, use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
 - 1) Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as proposed and functioning as specified.
 - 2) Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as proposed and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
 - 3) The Offeror may choose whether to use elements proven-in-use or proven-by-mock-up, unless either option is indicated as specifically required.
 - 4) Where test methods accompany performance requirements, use those test methods to test the mock-up.
 - a) Exception: Where a design analysis is specified, or allowed by the Dover AFB, substantiation of proven-in-use or proven-by-mock up construction is not required.
- b. Where a type of product is specified, without performance criteria specifically applicable to the element, use the type of product specified.
- c. Where more than one type of product is specified, without performance criteria specifically applicable to the element, use one of the types of products specified.
- d. Where a type of product is specified, with applicable performance criteria, use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
- e. Where more than one type of product is specified, with applicable performance criteria, use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.

- f. Where neither types of products nor performance criteria are specified, use products that will perform well within the specified life span of the building.

4. Products:

- a. Where a product is specified only by a manufacturer name and model number/brand name, use only that model/brand product. All air handlers, chillers, and compressors shall be provided by either TRANE, YORK, or CARRIER, and all HVAC direct digital controls supplied by TRANE SUMMIT; Emergency Generator supplied by ONAN; Fire Alarm Panel, Fire Alarm Transceiver and Antenna supplied by MONACO.
- b. Where the properties of a product are specified by description and/or with performance criteria, use products that comply with the description and/or performance criteria.
- c. Where manufacturers are listed for a particular product, use a product made by one of those manufacturers that also complies with other requirements.

C. SUBSTANTIATION

- 1. Definition: Substantiation is any form of evidence that is used to predict whether the design will comply with the requirements or to verify that the construction based on the design actually does comply. During Preliminary Design, Design Development, and Construction Documents, requirements to submit substantiation are primarily intended to forestall use of designs or constructions that will not comply. At any time before completion of construction, substantiation is presumed to be only a prediction and may subsequently be invalidated by actual results.
 - a. Regardless of whether substantiation is specified or not, the actual construction must comply with the specified requirements and may, at the Dover AFB's discretion, be examined, inspected, or tested to determine compliance.
 - b. Substantiation submittals will generally only be reviewed for conformance with the contract requirements, not to be approved or accepted. However, review of and/or concurrence with substantiation will not constitute approval or acceptance of deviations from the specified requirements unless those deviations are specifically identified as such on the submittal.
 - c. The Dover AFB accepts the responsibility to review substantiation submittals in a timely manner and to respond if they are unacceptable.

2. In addition to the requirements stated in other chapters, provide the following substantiation of compliance at each stage of the project:
 - a. If a substantiation requirement is specified without an indication of when it is to be submitted, submit or execute it before the end of Construction Documents.
3. Previous Construction: Where elements proven-in-use are used to comply with performance requirements:
 - a. In the Proposal, identify which elements will be accomplished using proven-in-use elements.
 - b. During Design Development, identify proven-in-use elements proposed for use, including building name, location, date of construction, owner contact, and description of design and materials in sufficient detail to enable reproduction in this project.
4. Mock-Up Testing: Where elements proven-by-mock-up are used to comply with performance requirements:
 - 1) ~~In the Proposal, identify which elements will be accomplished using proven-by-mock-up elements.~~
 - 2) During Design Development, identify proven-by-mock-up elements proposed for use, with test report including date and location of test, name of testing agency, and description of test and mock-up.
 - 3) Mock-up testing need not have been performed specifically for this project, provided the mock-up is substantially similar in design and construction to the element proposed.
5. Design Analyses (including Engineering Calculations):
 - a. The Design Analysis textual portion shall follow the format as required by COE Philadelphia District - Engineering Instruction Manual (NAP-EIM), with design calculation being appendices to the Design Analysis. A complete design analysis shall be submitted and updated for each level/phase of design phase submittal required by this RFP.
 - b. Where a design analysis or calculation is specified without identifying a particular method, perform analysis in accordance with accepted engineering or scientific principles to show compliance with specified requirements, and submit report that includes analysis methods used and the name and qualifications of the designer. Include the calculations as part of the regular design analysis.

- c. Where engineering design is allowed to be completed after commencement of construction, substantiation may be in the form of shop drawings or other data.
 - d. Submit design analyses at the end of Design Development unless otherwise indicated.
 - e. Where design analysis is specified to be performed by licensed design professional, use a design professional licensed in the US.
 - f. Submit a fire protection design analysis as required by UFC 3-600-1.
6. Products:
- a. Where actual brand name products are not identified by either the Dover AFB or the Offeror, identify the products to be used.
 - b. In the Proposal:
 - 1) Identify one or more product types for each system, assembly, or element.
 - 2) For each product type, provide brief descriptive or performance specifications.
 - 3) For major manufactured products that are commonly purchased by brand name, and any other products so indicated, identify at least one manufacturer that will be used.
 - c. During Preliminary Design or Design Development:
 - 1) Where more than one product type is identified for a particular system, assembly, or element, identify exactly which type will be used.
 - 2) For each product type, provide descriptive or performance specifications; early submittals may be brief specifications, but complete specifications are required prior to completion of construction documents.
 - 3) For each product type, identify at least one manufacturer that will be used.

- 4) For major manufactured products that are commonly purchased by brand name, and any other products so indicated, provide manufacturer's product literature on at least one actual brand name product that meets the specifications, including performance data and sample warranty.
- d. During Construction:
- 1) Identify actual brand name products used for every product, except commodity products specified by performance or description.
 - 2) Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
 - 3) Provide manufacturer's product literature for each brand name product.
 - 4) Provide the manufacturer's certification that the product used on the project complies with the contract documents.
- e. Before End of Closeout: Provide copies of all manufacturer warranties that extend for more than one year after completion.

END OF PART III

CHAPTER A – SUBSTRUCTURE

A. Performance:

1. Basic Function:

a. Provide substructure as required to support the completed structures and their functions safely and without uncontrolled subsidence or other movement.

b. Substructure comprises the following elements:

1) Foundations: Elements responsible for transferring dead loads, live loads, and environmental loads of completed structures to the earth in such a way that the structures are supported evenly and without movement.

c. Where substructure is integral with elements defined within another element group, meet requirements of both element groups.

d. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance.

2. Amenity and Comfort:

a. Thermal Performance: Provide thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:

1) Energy Efficiency: As specified in PART III - Facility Performance.

2) Average Thermal Transmittance: U-value of 7.64 Watts/Sq. ft. - Degree KSI maximum, for portions of substructure in contact with earth and enclosing conditioned space.

3) Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 97-1/2 percent of the days in the coldest 3 months of the year.

4) Minimum thermal performance values for individual substructure elements are also specified in other chapters.

5) Substantiation:

a) Preliminary Design (15%): Identification of major thermal resistant materials and systems.

b) Design Development (35%): Detailed listing of design criteria and design analysis, prepared by a licensed mechanical engineer.

c) Construction Documents: Product data on thermal materials and details of continuous thermal barrier.

b. Water Penetration: Prevent ground water penetration into the interior of the building, under any circumstances.

1) Substantiation:

a) Preliminary Design: Identification of major water resistant assemblies, and drainage features.

b) Construction Documents: Details of proven-in-use or proven-by-mock-up design.

c. Water Accumulation: Prevent accumulation of water in crawl spaces, or open areas adjacent to substructure.

1) Substantiation:

a) Preliminary Design: Identification of dewatering methods to be used.

b) Construction Documents: Details of proven-in-use or proven-by-mock-up design.

d. Acoustical Performance: Limit sound transmission through substructure as follows:

1) Ambient Sound Level: Maintain ambient sound levels in enclosed, occupied substructure spaces within noise criteria (NC) ranges specified in Chapter C - Interiors during normal hours of occupancy.

~~2) Vibration Control: Use substructure elements that will not resonate at frequencies that are characteristic of ambient underground sound and vibration sources at the project site.~~

3) Minimum performance values for individual substructure elements are also specified in other chapters.

4) Substantiation:

a) Proposal: Identification of substructure elements required as sound barriers and proposed methods of meeting requirements.

b) Preliminary Design: Measurements of ambient site noise levels over full range of audible frequencies, identification of acoustic properties of major below grade sound and vibration generators, and preliminary analysis prepared by an acoustical engineer.

c) Construction Documents: Drawings showing details required for acoustic performance.

d) Construction: Field tests of representative spaces to verify compliance with performance requirements.

3. Health and Safety:

- a. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
- b. For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
- c. For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc. and Factory Mutual.
- d. Minimum performance values for individual substructure elements are also specified in other chapters.
- e. Substantiation:
 - 1) Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
 - 2) Construction Documents: Identifying numbers on the construction drawings.
 - 3) Substance Exclusion: Prevent accumulation of harmful chemicals and gases such as radon, and methane in spaces below substructure and subsequent penetration into occupied spaces.
 - 4) Substantiation:
 - a) Preliminary Design: Identification of major radon resistant assemblies, chemical resistant assemblies, and ventilation features.
 - (i) Construction Documents: Details of proven-in-use or proven-by-mock-up design.
- f. Vermin Protection: Provide permanent protection against infestation of construction by ground dwelling termites and other vermin.
 - 1) Substantiation:
 - a) Preliminary Design: Identification of major termite resistant assemblies intended for protection against termites and other vermin.
 - b) Construction Documents: Details of proven-in-use or proven-by-mock-up design.
4. Structure:
 - a. Capacity: Provide load-bearing substructure members as required by code and designed to distribute dead loads, live loads, and environmental loads so that bearing capacity of soil is not exceeded.
 - 1) Extend bearing portions of substructure to levels below frost line at project location; not less than 22 inches below grade per UFC 3-310-01.

2) Provide spread footings that do not exceed the allowable soil bearing capacity, caissons or drilled piers that bear on rock, piles that provide adequate friction to withstand loading, or other foundation systems acceptable to governing authorities.

b. Dead Loads: Accommodate loads from weights of building materials, construction itself, and all fixed service equipment.

c. Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads as prescribed by code or concentrated loads, whichever are more demanding structurally.

1) Uniformly Distributed Loads: As required by code for building occupancy.

2) Concentrated Loads: As required by project program and building design.

d. Environmental Loads: Accommodate loads from all environmental forces in accordance with code and the following:

1) Lateral Soil Loads: Lateral pressure of soil adjacent to vertical substructure elements, including potential surcharge from fixed or moving loads and potential hydrostatic pressure.

a) Increase lateral pressure assumptions if expansive soils have been identified by a geotechnical investigation, unless expansive soils are excluded from backfill.

2) Vertical Soil Loads: Full hydrostatic pressure applied over entire substructure area.

a) Increase vertical pressure assumptions if expansive soils have been identified by a geotechnical investigation, unless expansive soils removed and replaced by no expansive soils to a minimum depth of 24 inches below horizontal substructure elements.

3) Soil bearing capacity Soil Bearing Capacity – Preliminary subsurface sampling was performed by Schnabel Engineering and the data will be presented in this RFP upon its completion for the contractor's use in evaluating feasible foundation systems. For the purposes of RFP proposal development, it is anticipated that conventional spread foundations are feasible. Bearing capacity for various areas of the project could vary depending on the amount of site preparation undertaken. It is anticipated that bearing on existing fills will result in allowable bearing pressures of approximately 2.0 ksf, however, there is concern about the amount of differential settlements for this condition. Alternate options such as undercutting and backfilling with new compacted fills, rammed stone piers or stone columns could improve bearing capacities anywhere from 3.0 ksf up to 7 ksf. Actual soil bearing capacities shall be determined from additional geotechnical investigations conducted by the contractor. The contractor shall consider the settlement requirements and tolerances of each project area in determining the suitable foundation design. It is anticipated that existing fill soils are suitable for support of new floor slabs, however, some undercutting of soft or unsuitable soils should be expected.

4) Earthquake: In accordance with requirements of PART III - Facility Performance.

5) Wind: Overturning forces attributable to design wind speed at project location applied to full building height.

e. Substantiation:

1) Proposal: Identification of major structural materials and systems.

2) Preliminary Design: Soil investigation report, detailed listing of design criteria, and preliminary analysis, prepared by a licensed structural engineer.

3) Construction Documents: Detailed design analysis by licensed structural engineer.

5. Durability:

a. Corrosion Prevention: Provide supplementary protection for underground metal elements, sufficient to prevent corrosion completely for the service life of the element without maintenance.

1) Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements falling under these criteria:

a. Metal elements are buried in a soil environment known to cause corrosion on similar nearby structures.

b) Metal elements are buried in a soil environment in which stray DC electrical currents are present.

2) See Chapter D9 for requirements for cathodic protection.

6. Operation and Maintenance:

a. Provide substructure elements that will endure for the lifetime of the building with no maintenance.

B. Products

1. Use one of the following:

a. Reinforced concrete.

b. Precast, prestressed concrete.

c. Reinforced masonry.

d. Structural steel.

2. Do not use the following:

a. Treated wood.

C. Methods of Construction

1. Use the following methods and techniques:

a. Excavation, backfill, and compaction.

b. Pile driving.

c. Caisson or pier drilling.

d. Insulated concrete form foundation walls.

CHAPTER A1 – FOUNDATIONS**A. Performance****1. Basic Function:**

- a. Provide foundations as required to support the completed structures and their functions safely and without uncontrolled subsidence or other movement.
- b. Foundations comprise the following elements:
 - 1) Standard Foundations: Includes spread footings below columns, linear spread footings below load bearing walls, foundation walls not part of basements, caisson (pier) caps, and pile caps.
 - 2) Other Foundations: All types of special foundation systems, including piles, and drilled piers (caissons).
 - 3) Floors on Grade: All elements necessary for slab foundations, including trenches, pits, and sumps, equipment bases, integral thermal insulation, slab moisture protection, and subdrainage system.
- c. Where foundations are integral with elements defined within another element group, meet requirements of both element groups.
- d. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance and PART III-Chapter A - Substructure.

2. Amenity and Comfort:

- a. Thermal Performance:
 - 1) Thermal Resistance: R-value of 1.23 SI, minimum, for portions of foundation above grade or within 9 inches below grade and enclosing conditioned space.
 - 2) Minimum thermal performance values for individual foundation elements are also specified in other chapters.
- b. Water Protection:
 - 1) Waterproofing: Provide permanent waterproofing at portions of foundation that extend below water table and enclose habitable space.

- 2) Drainage: Provide method of collecting and draining water from below portions of foundation that enclose habitable space.
- 3) Substantiation:
 - a) Design Development: Subsurface investigation to identify location of water table and identification of areas requiring water protection systems.
 - b) Construction Documents: Product data on specific water protection materials and systems; details of construction to achieve permanent water protection.
- c. Acoustical Performance:
 - 1) Vibration Control: Use **below grade** foundation elements that are designed to avoid sympathetic vibration at frequencies within the audible range of 500-4000 Hz.
 - a) Mass: ~~Not less than 245 lbs./sq. ft.~~
 - b) ~~Air Space: Not less than 1 1/2 inches wide void within overall foundation element.~~
3. Structure:
 - a. Capacity: Provide load bearing foundation members as required by Chapter.A - Substructure.
 - 1) Minimum Wall Thickness: Not less than thickness of superstructure walls supported by foundation walls.
 - 2) Minimum Wall Thickness: 8 inches.
 - 3) Footings: Minimum compressive strength of 3000 psi and minimum thickness of 12 inches.
 - 4) Pile, Pier, or Caisson Caps: Minimum compressive strength of 4000 psi and minimum thickness of 12 inches.
 - 5) Floors on Grade: Minimum compressive strength of 4000 psi and minimum thickness of 5 inches.
- B. Products:
 1. Use one of the following:
 - a. Concrete spread footings.
 - b. Drilled piers.

- c. Driven piles.
 - d. Concrete slab on grade at areas not requiring structural slab floor system.
 - e. Structural slab floor system at areas as required.
- 2. Do not use any of the following:
 - a. Wood foundation systems.
 - b. Masonry footings.

CHAPTER A13 - FLOORS ON GRADE**A. Performance:****1. Basic Function:**

- a. Provide floors on grade as required to enclose habitable spaces and support interior functions without subsidence, structural cracking, or other uncontrolled movement.
- b. Floors on grade comprise structural slabs, individual pavers, and framed flooring systems that are installed over fill or at excavated and compacted grade, including all depressions in the floor, such as trenches, pits, and sumps. Floors on grade also include equipment bases, under floor and perimeter drainage, thermal insulation at floor edge, and moisture barriers installed integrally with floor system.
 - 1) Floor Flatness (FF): Provide floors on grade engineered and constructed to achieve degree of flatness as follows, when measured in accordance with ASTM E 1155-1996:
 - a) Specified Overall Value (SOV): 35.
 - b) Minimum Localized Value (MLV): 24.
 - 2) Floor Levelness (FL): Provide floors on grade engineered and constructed to achieve degree of levelness as follows, when measured in accordance with ASTM E 1155-1996:
 - a) Specified Overall Value (SOV): 25.
 - b) Minimum Localized Value (MLV): 17.
- c. Where floors on grade are integral with elements defined within another element group, meet requirements of both element groups.
- d. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance, Chapter A - Substructure, and Chapter A1 - Foundations.

2. Amenity and Comfort:

- a. Thermal Performance: Provide thermal properties at edges of floors on grade as necessary to maintain interior comfort levels specified and in accordance with code.
 - 1) Thermal Insulation: Provide R-value of 5, minimum, for portions of floors on grade within 24 inches of exposed building exterior.

- 2) **Offices - Floor Edge Heating:** Maintain temperature of floor surface within 24 inches of exposed building exterior at not less than 21 degrees C under winter design conditions.
 - 3) **Vapor Retardation:** Limit vapor transmission through floor construction to maximum rate of 4.11 perm/in at locations where impermeable applied interior finishes such as resilient flooring, wood flooring, or acrylic terrazzo are used.
 - a) Use supplementary vapor retarder if necessary to meet requirements.
 - b) Use method of sealing joints between vapor retarder elements that will be effective given available construction practices.
 - 4) **Substantiation:**
 - a) **Design Development:** Design criteria and design analysis, prepared by licensed mechanical engineer.
 - b) **Construction Documents:** Product data on thermal materials and details of construction to achieve required thermal performance.
- b. **Waterproofing:** Provide permanent waterproofing for floors on grade that could potentially come into contact with ground water. Acceptable methods are any of the following:
- 1) Permanent, waterproof barrier beneath floor construction, in conjunction with providing a granular capillary barrier under slabs on grade protected against damage from floor installation.
 - 2) Permanent, waterproof barrier installed between separate layers of floor construction.
 - 3) Permanent, waterproof barrier installed as coating on interior side of floor construction.
 - 4) **Substantiation:**
 - a) **Design Development:** Subsurface investigation to identify location of water table and identification of areas requiring waterproofing systems.
 - b) **Construction Documents:** Product data on waterproofing and details of construction to achieve permanent waterproofing.
- c. **Vibration Control:** Use elements for floors on grade that are designed to avoid sympathetic vibration at frequencies within the audible range of 500-4000 Hz.
- 1) **Mass of Floor Construction:** ~~Not less than 80 lbs./sq. ft.~~

3. Health and Safety:

- a. Radon Exclusion: Prevent accumulation of radon and subsequent penetration into building interior, in accordance with substance exclusion provisions of Chapter A - Substructure.
 - 1) Airtight floor construction.
 - 2) Impermeable seals at all service penetrations of floor construction.
 - 3) Building pressurization in accordance with recommendations of EPA/625/R 92/016-1994.
- b. Termite Protection: Provide protection against infestation of ground-dwelling termites, in accordance with vermin protection provisions of Chapter A.
 - 1) Treatment of soil adjacent to and beneath floor with EPA-approved chemicals prior to basement construction.
 - 2) Elimination of gaps or cracks in floor construction.
 - 3) Impermeable seals at all service penetrations of floor construction.
 - 4) No use of untreated wood within 18 inches of soil.
 - 5) No use of continuous planes of exterior foam insulation extending from below grade to areas above grade.

4. Durability:

- a. Floor Classifications: For concrete floors on grade, comply with composition and finishing recommendations of ACI 302.1R-1996 for floor classifications based on type of anticipated traffic and intended use.
 - 1) Minimum 28-day compressive strength of 4,000 psi; maximum slump of 4 inches:
- b. Water-Cement Ratio: For concrete slabs on grade that are partly or completely exposed to freezing conditions, limit water-cementitious materials ratio as recommended by ACI 302.1R-1996.
 - 1) Moderate to Severe Exposure: Maximum 0.50.
- c. Air Content: For concrete slabs on grade that are partly or completely exposed to freezing conditions, provide air content in accordance with recommendations of ACI 201.2R-1992.

B. Products:

- 1. Use one of the following:

- a. Concrete floor slabs throughout the project.
- 2. Do not use any of the following:
 - a. Masonry pavers on compacted fill.
 - b. Wood flooring on treated wood sleepers.
 - c. Bituminous concrete paving.

END OF CHAPTER A13

CHAPTER B – SHELL**A. Performance:****1. Basic Function:**

- a. Provide permanently enclosed spaces for all functional areas shown in the project program, unless otherwise indicated. Provide a physical enclosure that keeps out weather, unwelcome people, animals, and insects without requiring specific action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside. Provide level floor areas, comfortable ceiling heights, and essentially vertical walls. Provide adequate shielding in antiterrorist zones on the site, and adequate acoustical shielding relative to air traffic for the safety and comfort of the occupants respectively. Portions of the facility within anti-terrorism/force protection zones on site must conform to the DoD Antiterrorism/Force Protection Minimum Construction Standards.
- b. The elements forming usable enclosed space and separating that space from the external environment comprise the shell and consist of:
 - 1) Superstructure: All elements forming floors and roofs above grade and within basements, and the elements required for their support, insulation, fireproofing, and firestopping.
 - 2) Exterior Enclosure: All essentially vertical elements forming the separation between exterior and interior conditioned space, including exterior skin, components supporting weather barriers, and jointing and interfacing components; not including the interior skin unless an integral part of the enclosure.
 - 3) Roofing: All elements forming weather and thermal barriers at horizontal and sloped roofs and decks, and roof fixtures.
- c. Exterior Surfaces Exposed to View: Surfaces visible from street or ground level, plus surfaces visible from windows of same building and adjacent existing buildings.
- d. Where shell elements also function as elements defined within another element group, meet requirements of both groups.
- e. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance.
- f. The Structural Standing Seam Metal Roof (SSSMR) shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements; and /or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including,

but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip-sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylight; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weather tight roof system; and items specified in other sections of these specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with the Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall start upon final acceptance of the facility. It is required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire SSSMR system as outlined above.

Manufacturer's Material Warranties: The Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashings, accessories, and trim, fabricated from coil material:

- 1) A manufacturer's 20 year material warranty warranting the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.
- 2) A manufacturer's 20 year exterior material warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.
- 3) A roofing system manufacturer's 20 year, non-prorated, system weather tightness warranty.

2. Amenity and Comfort:

- a. Thermal Performance: Provide construction that will have thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:
 - 1) Energy Efficiency: As specified in Part II.
 - 2) Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 98 percent of the days in the coldest 3 months of the year.
 - 3) Components That Have Surfaces Facing Both Interior and Exterior Environment: Condensation Resistance Factor (CRF) as required to meet requirement above, when tested in accordance with AAMA 1503.1-1998.
 - 4) Minimum thermal performance values for individual shell elements are also specified in other chapters.
 - 5) Substantiation:
 - a) Preliminary Design (15%): Identification of major thermal resistant materials and systems.
 - b) Design Development (35%): Detailed listing of design criteria and design analysis, prepared by licensed mechanical engineer.
 - c) Construction Documents: Product data on thermal materials and details of continuous thermal barrier.
- b. Air Infiltration: Maximum of 0.1059 cfs per square yard of exterior surface area, measured in accordance with ASTM E 283-1991 at differential pressure of 6.22 psf.
 - 1) Use supplementary air barrier if necessary to maintain performance over entire shell.
 - 2) Use method of sealing joints between elements that will be effective given available construction practices.
- c. Water Penetration: Design and select materials to prevent water penetration (wind-driven rain, wash-down pressure spraying or otherwise) into the interior of the building, under conditions of rain driven by wind at 105 mph per UFC 3-310-01.
 - 1) Substantiation:
 - a) Preliminary Design (15%): Identification of major water resistant assemblies.

- b) Design Development (35%): Details of proven-in-use and proven-by-mock-up design.
- d. Natural Light: Provide fenestration in shell as required to meet requirements for natural light as specified in Chapter C and in accordance with code.
- e. Natural Ventilation: Design and construct shell to provide natural ventilation in accordance with code and the following **for the 2-level MPETV storage area in the Outsized Cargo Facility. All other spaces, to include non-air conditioned spaces shall have mechanical ventilation.**
 - 1) Minimum Ventilation Opening Area: 8 percent of total floor area for each habitable room; not required for bathrooms, toilet compartments, closets, halls, or storage and utility spaces.
 - 2) Ventilation Area: Minimum 10 percent of wall area for each floor equally distributed on two elevations.
 - 3) Design ventilation to provide cross ventilation where possible.
 - 4) Substantiation:
 - a) Proposal: Identification of spaces relying on natural ventilation with description of ventilation concept and required building elements.
 - b) Design Development: Drawings showing natural ventilation location, ventilation opening areas, and floor areas being served.
 - c) Construction Documents: Engineering design calculations and drawings prepared by licensed engineer.
- f. Acoustical Performance: Design and construct the shell to limit sound transmission as follows:
 - 1) Ambient Sound Level: Maintain ambient sound levels in perimeter spaces within Noise Criteria (NC) ranges specified in Chapter C - Interiors during normal hours of occupancy.
 - 2) Exterior Noise Level: Maintain maximum average daytime and nighttime noise level from interior sound sources in accordance with local regulations, measured at the project property line.
 - 3) Vibration Control: Use shell elements that will not resonate at frequencies that are characteristic of ambient exterior sound sources at the project site.
 - 4) Minimum performance values for individual shell elements are also specified in other chapters.
 - 5) Substantiation:

- a) Proposal: Identification of exterior enclosure elements required as sound barriers and proposed methods of meeting acoustical requirements.
- b) Preliminary Design: Measurements of ambient site noise levels over full range of audible frequencies, identification of acoustic properties of major interior and exterior sound and vibration generators, and preliminary analysis prepared by an acoustical engineer.
- c) Design Development: Acoustical analysis prepared by an acoustical engineer.
- d) Design Development: Mock-up tests or proven-in-use substantiation.
- e) Construction Documents: Drawings showing details required for acoustic performance.
- f) Construction: Field tests of representative spaces to verify compliance with performance requirements.
- g. Cleanliness of Exterior Surfaces: Design and select materials to:
 - 1) Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust and dirt.
 - 2) Be washed reasonably clean by normal precipitation.
 - 3) Prevent precipitation from washing settled dust and dirt over surfaces exposed to view.
- h. Appearance: Design and select materials to provide exterior appearance with characteristics as follows:
 - 1) Compatible with Dover AFB Standards.
 - 2) Concealing mechanical equipment, plumbing equipment, electrical equipment , and piping, conduit, and ducts from view from the street.
 - 3) Do not use rooftop mechanical equipment, per AMC policy letter. Vents and fans may be permitted if access for maintenance is also provided.
 - 4) Substantiation:
 - a) Preliminary Design: Drawings showing facade treatment for principal elevations identifying visible materials.
 - b) Design Development: Drawings and artist's rendering showing all building elements that are part of the shell with sizes and locations to scale.

- c) Construction Documents: Details of building shell, annotated to show compliance with performance requirements.

3. Health and Safety:

- a. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
 - 1) For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
 - 2) For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc., Underwriters' Laboratories of Canada, Inchcape Testing Services (Warnock-Hersey), and Factory Mutual.
 - 3) Minimum performance values for individual shell elements are also specified in other chapters.
 - 4) Substantiation:
 - a) Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
 - b) Construction Documents: Identifying numbers on the construction drawings.
- b. Accidental Injury: Design and select materials to protect pedestrians, and building occupants in accordance with code and the following:
 - 1) Prevent ice and snow from falling off building elements onto pedestrians, building occupants, and vehicles.
 - 2) Substantiation: As specified in PART III - Facility Performance.
- c. Physical Security: Design and construct to provide protection as follows:
 - 1) Opaque Elements at Ground Level: Use materials that give the impression of strength, for discouragement of opportunistic attempts at intrusion.
 - 2) Glazed Elements at Ground Level: Minimize size and locate where under surveillance by staff at their normal workstations.
- d. Ventilation of Special Spaces: Design and construct shell to provide outside air movement through enclosed shell volumes in accordance with code and the following:

- 1) Minimum Ventilation Opening Area: Net 1.0 percent of total enclosed area, distributed to encourage uniform outside air movement through enclosed space.
- 2) Substantiation:
 - a) Proposal: Identification of volumes relying on natural ventilation with description of ventilation concept and required building elements.
 - b) Design Development: Drawings showing natural ventilation location, ventilation opening areas, and volumes being served.

4. Structure:

- a. Structural Performance: Design and select materials to support all loads without damage due to loads, in accordance with code.
 - 1) Capacity: Design and provide load-bearing structural members of capacities required by code.
 - 2) Dead Loads: Design to resist loads from weights of material, construction, and fixed service equipment.
 - 3) Live Loads: Live load allowance shall be in accordance with ASCE 7, latest edition.
 - a) Floors: Resist uniformly distributed, concentrated, and impact loads with code permitted live load reductions.
 - b) Roofs: Resist uniformly distributed, concentrated, and impact loads.
 - 4) Special Loads: In addition to loads defined by code, design for loads from moving machinery, elevators, cranes, and vehicles.
 - 5) Special Components: If design method is not specifically prescribed by code, design in accordance with UFC 3-310-01 or ASCE 7 (latest), wherever is more stringent.
 - 6) Environmental Loads: Environmental load allowance shall be as referenced in UFC-3-310-01 and in accordance with ASCE 7, latest edition, whichever is more stringent. Seismic load allowance shall be as referenced in T1 809-04, latest version.
 - a) Wind: Basic wind speed in accordance with code, 105 MPH minimum, Building Classification Category IV, Exposure C.
 - b) Snow: Ground snow load in accordance with code, and corresponding to a 100 Year Mean Recurrence Interval, 25 psf minimum, Building Classification-Category IV. Refer to TI 809-52, Commentary On Snow Loads.

- c) Rain: Resist loads from ponding rainwater when the primary drainage system is blocked. Provide for rain-on-snow provisions in accordance with code.
 - d) Earthquake: In compliance with provisions of code, seismic use group IIIE, Site Seismicity: Minimum short period special acceleration (0.2 sec) of 0.20g. Minimum 1-second period special acceleration of 0.07g.
 - 7) Design and provide shell elements to resist loosening or detachment in winds equivalent to the code design wind speed.
 - 8) Shell elements engineered by their manufacturer or fabricator, rather than by the engineer-of-record, shall comply with the following additional requirements:
 - a) Manufacturer/fabricator employs licensed structural engineer to accomplish design of structural elements.
 - b) Manufacturer/fabricator has minimum of 5 years experience in the design and manufacture of similar structures.
 - 9) Structural Design: In accordance to the requirements of the code.
 - 10) Structural Serviceability: Comply with requirements and recommended design procedures of the code.
 - 11) Substantiation:
 - a) Proposal: Identification of major structural materials and systems.
 - b) Preliminary Design: Detailed listing of design criteria and preliminary analysis, prepared by a licensed structural engineer.
 - c) Construction Documents: Detailed design analysis by licensed structural engineer (for structures engineered by their manufacturer or fabricator, engineer-of-record may provide detailed design criteria, with design analysis postponed until construction stage).
 - d) Construction: For structures engineered by their manufacturer or fabricator, detailed design analysis prepared by and shop drawings stamped by a licensed structural engineer, with approval of engineer-of-record recorded.
 - b. Construction Loads and Erection Stresses: Accommodate temporary construction loads and erection stresses during construction.
5. Durability:
- a. Service Life Span: Same as building service life, except as follows:

- 1) Load-Bearing Structural Members: Minimum of 100 years.
 - a) No anticipated deterioration when protected as specified.
 - b) Protective Elements: Minimum 25 years.
 - 2) Wall Primary Weather-Barrier Elements: Minimum 50 years functional and aesthetic service life, excluding joint sealers.
 - 3) Transparent Elements (Glazing): Same as other wall primary weather-barrier elements, except accidental breakage is considered normal wear-and-tear.
 - 4) Joint Sealers: Minimum 20 years before replacement.
 - 5) Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
 - 6) Roof Covering Weather-Barriers: Minimum 20 years, fully functional (no-penal sum weather tight warranty which includes all components within roofing system, including penetrations and all flashing components).
 - 7) Substantiation: As specified in Part III - Facility Performance, including service life analysis, and life cycle cost analysis.
- b. Water Penetration: Design and select materials to prevent water penetration into the interior of shell assemblies, under conditions of rain driven by 105 mph wind.
- 1) Exception: Controlled water penetration is allowed if materials will not be damaged by presence of water or freezing and thawing, if continuous drainage paths to the exterior are provided, and water passage to the building interior is prevented.
 - 2) Substantiation: In addition to requirements specified for proven-in-use and proven-by-mock-up construction, drawings showing paths of water movement, with particular attention to changes in direction or orientation and joints between different assemblies.
- c. Weather Resistance: Design and select materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, salt air , and atmospheric pollutants.
- 1) Deterioration includes corrosion, shrinking, cracking, spalling, delamination, abnormal oxidation, decay and rot.
 - 2) Surfaces Exposed to View: Deterioration adversely affecting aesthetic life span includes color fading, crazing, and delamination of applied coatings.

- a) Coated Finishes: Minimize use of materials with separate coated finishes.
- b) Coating Performance: AAMA 2603-1998, minimum.
- c) Coating Salt Spray Resistance: No deterioration when tested in accordance with ASTM B 117-1997 for 1000 hour exposure with 5 percent salt fog at 95 degrees F.
- 3) Joint Components and Penetration Seals: Capable of resisting expected thermal expansion and contraction; use overlapping joints that shed water wherever possible.
- 4) Transparent Elements (Glazing): No haze, loss of light transmission, or color change, during entire expected service life.
 - a) Test Criteria: Less than 1 percent change in haze, transmission, and color over 2 years exposure, when tested after natural exposure conditions or accelerated light and water conditions simulating natural exposure at project, in accordance with ASTM D 1003-1997; accelerated exposure documented with comparison to natural conditions.
- 5) Service Temperature: Low temperature equal to historically-recorded low; high temperature equal to that expected due to any combination of air temperature and heat gain from solar and other sources.
- 6) Freeze-Thaw Resistance: Adequate for climate of project.
- 7) Corrosion Resistance: In locations exposed to the outdoor air or in potential contact with moisture inside shell assemblies, use only corrosion-resistant metals as defined in this Chapter.
- 8) Ozone Resistance: Do not use materials that are adversely affected by ozone.
- 9) Substantiation:
 - a) Proposal: Identification of weather-exposed elements and proposed materials.
 - b) Design Development: Details of proven-in-use materials and test reports.
- d. Impact Resistance: Design and select materials to resist damage due to impact in accordance with code and the following:
 - 1) Minimize damage from windborne debris propelled at up to 105 mph.
Debris shall not penetrate the shell. The shell within 30 feet of grade shall meet the requirements of the Large Missile Test of ASTM E

1996, and for more than 30 feet above grade, the provisions of the Small Missile Test of E 1996.

- 2) Minimize damage due to potential vandalism.
- 3) Minimum performance values for individual shell elements are also specified in other chapters.
- 4) Substantiation:
 - a) Design Development: Identification of building elements required to resist impact damage, quantification of impact criteria, materials to be used, and methods of substantiation.
 - b) Design Development: Proven-in-use or proven-by-mock-up data.
- e. Moisture Vapor Transmission: Design to prevent deterioration of materials due to condensation of moisture vapor inside assemblies.
 - 1) Use supplementary vapor retarder if necessary to meet requirements.
 - 2) Use method of sealing joints between elements that will be effective given available construction practices.
 - 3) Substantiation:
 - a) Design: Identification of building elements providing moisture barrier, materials to be used, and data showing performance.
 - b) Design Development: Proven-in-use or proven-by-mock-up data.
- f. Wear Resistance: Design and select materials to provide resistance to normal wear-and-tear in accordance with code and the following:
 - 1) Elements Within Reach of Pedestrians: Minimize degradation from rubbing and scratching caused by pedestrians.
 - 2) Substantiation:
 - a) Design Development: Identification of building elements required to resist wear, quantification of wear criteria, materials to be used, and methods of substantiation.
 - b) Construction Documents: Proven-in-use or proven-by-mock-up data.

B. Products:

1. Corrosion-Resistant Metals:
 - a. Hot-dipped galvanized steel, with minimum zinc coating of 9oz/sq. yd. total, both sides.

- b. Stainless steel, Type 304 or 316.
- c. Aluminum.
- 2. Coated Finishes:
 - a. Use one of the following:
 - 1) Fluoropolymer coating (70 percent Kynar 500 (tm) or Hylar 5000(tm)), minimum two coats.
 - b. Do not use:
 - 1) Baked enamel.
 - 2) Paint.
- 3. 2.3 Construct the shell using one of the following:
 - a. Cast-in-place concrete.
 - b. Precast concrete.
 - c. Structural steel braced frame.
- 4. Do not use:
 - a. Air-supported structure.
 - b. Pre-engineered glazed structure.
 - c. Different metals subject to galvanic action in direct contact with each other.
 - d. Aluminum in direct contact with concrete or cementitious materials.
 - e. Wood trim.

C. Methods of Construction:

- 1. Construct the shell using one of the following methods:
 - a. Flying forms for cast-in-place concrete.
 - b. Shop fabricated building modules for field assembly.
 - c. Insulated concrete form walls.
 - d. Exterior insulation finish system (EIFS), face brick/CMU matching base standard.
- 2. Do not use:

- a. Geodesic domes.
- b. Dead-flat roofs.

END OF CHAPTER B

CHAPTER B1 – SUPERSTRUCTURE

A. Performance:

1. Basic Function:

- a. Provide structural elements, above grade, capable of supporting all anticipated loads without failure or damage.
- b. Do not use any electrically-operated or fuel-powered construction for support of floor or roof members.
- c. The superstructure comprises:
 - 1) High Bays: Bay construction above grade and elements required for their support, insulation, fireproofing, and firestopping.
 - 2) Elevated Floors: Floor construction above grade including mezzanines, and ramp floors, floors elevated for access, stair construction if part of the structure, and the elements required for their support, insulation, fireproofing, and firestopping.
 - 3) Outside Covered Storage: Canopy construction at grade and elements required for their support and fireproofing. Hazardous Materials Storage: Hazardous Material Storage construction and elements required for support, insulation, fireproofing, and firestopping.
 - 4) Roofs: Roof construction, including canopies, and elements required for their support, insulation, fireproofing, and firestopping.
 - 5) Where superstructure elements also must function as elements defined within another element group, meet requirements of both element groups.
- d. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance and Chapter B - Shell.

2. Amenity and Comfort:

- a. Water Penetration: Where roof coverings as specified in Chapter B3 are not used over roofs provide supplementary waterproof construction providing equivalent protection.
- b. Vibration: Isolate structure from sources of vibration.
 - 1) External Sources: Existing vibration sources adjacent to and on site.

3. Health and Safety:

- a. Fire: Provide members with combustibility, flame spread, and smoke generation characteristics not greater than allowed by code.
- b. Fire Resistance: Design and select materials to provide fire resistance in accordance with code and the following:
 - 1) Determine fire resistance rating by testing in accordance with ASTM E 119-1998.
 - 2) Determine flame spread index by testing in accordance with ASTM E 84-1998.
 - 3) Determine smoke developed index by testing in accordance with ASTM E 84-1998.
 - 4) Where fire resistance integrity of superstructure assemblies is impaired by subsequent installation of other construction elements, restore fire resistance using identical materials or other materials tested under ASTM E 814-1997.
 - 5) Provide firestopping at openings in fire-rated superstructure elements that is rated at not less than the required fire resistance of the penetrated element.
 - 6) Minimum performance values for individual superstructure elements are specified in other chapters.
 - 7) Substantiation:
 - a) Proposal: Identification of major fire resistive materials and systems.
 - b) Preliminary Design: Identification of major fire resistive materials and systems.
 - c) Design Development: List of laboratory tested fire resistive assemblies to be used.
 - d) Construction Documents: Identification of laboratory test numbers on the construction drawings for fire resistive assemblies to be used.
- c. Grounding: When grounding of electrical systems is accomplished using structural members, design to prevent shock to occupants.

4. Structure:

- a. Capacity: Design and provide load-bearing structural members of capacities required by code.
 - b. Dead Loads: Design to resist loads from weights of materials, construction, and fixed service equipment.
 - c. Live Loads: Live load allowance shall be in accordance with ASCE 7, latest edition.
 - 1) Floors: Resist uniformly distributed, concentrated, and impact loads with code permitted live load reductions.
 - 2) Roofs: Resist uniformly distributed, concentrated, and impact loads.
 - d. Environmental Loads: Environmental load allowance shall be as referenced in UFC-3 –310-01 and in accordance with ASCE 7, latest edition, whichever is more stringent. Seismic load allowance shall be as referenced in TI 809-04, latest version.
 - 1) Wind: Basic wind speed in accordance with code, 105 MPH minimum, Building Classification Category IV, Exposure C.
 - 2) Snow: Ground snow load in accordance with code, and corresponding to a 100 Year Mean Recurrence Interval, 25 psf minimum, Building Classification-Category IV. Refer to TI 809-52, Commentary On Snow Loads.
 - 3) Rain: Resist loads from ponding rainwater when the primary drainage system is blocked. Provide for rain-on-snow provisions in accordance with code.
 - 4) Earthquake: In compliance with provisions of code, seismic use group IIIE, Site Seismicity: Minimum short period special acceleration (0.2 sec) of 0.20g. Minimum 1-second period special acceleration of 0.07g.
 - e. Structural Design: In accordance to the requirements of the code.
 - f. Structural Serviceability: Comply with requirements and recommended design procedures of the code.
5. Durability:
- a. Moisture Resistance of Load-Bearing Members: Use materials that are not damaged by contact with water or moisture vapor.
 - 1) Materials that will corrode in the presence of water may be used if protected from water.

- 2) Materials that will rot or be damaged by fungus may be used if protected from water.
- b. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
- c. Applied Fireproofing Materials:
 - 1) In Locations where Concealed by Permanent Construction:
 - a) Density: 35 ~~lbs/sq. ft.~~ **lbs/cu. ft.**, minimum.
 - b) Impact Strength: Passing ASTM E 760-1992(R96).
 - 2) Interior Locations, Where Exposed to Air but Out of Reach of Occupants (Above 10 feet from Floor):
 - a) Density: 45 lbs/sq. ft., minimum.
 - b) Impact Strength: Passing ASTM E 760-1992(R96).
 - c) Bond Strength: 2 psi, minimum, tested in accordance with ASTM E 736-1992.
 - 3) Exterior Locations, Where Exposed to Air but Out of Reach of Occupants (Above 3 m from Ground):
 - a) Density: 75 lbs/sq. ft., minimum.
 - b) Impact Strength: Passing ASTM E 760-1992(R96).
 - c) Moisture Resistance: Not affected by precipitation or freeze-thaw.
 - 4) Exposed Locations on Exterior and Interior within Reach of Occupants (Below 10 feet):
 - a) Density: 128 lb/sq. ft., minimum.
 - b) Impact Strength: Passing ASTM E 760-1992(R96).
 - c) Moisture Resistance: Not affected by precipitation or freeze-thaw.
 - d) Portions of Superstructure Exposed on Exterior: Comply with requirements of Chapter B for water penetration, weather resistance, impact resistance, and wear resistance.

B. Products:

1. Superstructure: Use elements specified in Chapters B11 through B15.

2. Fireproofing:

a. If applied fireproofing is required, use one of the following:

- 1) Concealed:
 - a) Sprayed-on cementitious.
 - b) Intumescent.
- 2) Interior, Exposed But Out of Reach:
 - a) Sprayed-on cementitious.
 - b) Sprayed-on medium-density cementitious.
 - c) Sprayed-on mineral fiber.
 - d) Sprayed-on medium-density mineral fiber.
 - e) Intumescent.
- 3) Exterior, Exposed But Out of Reach:
 - a) Sprayed-on medium- or high-density cementitious.
 - b) Intumescent.
- 4) Exposed within Reach:
 - a) Sprayed-on high-density cementitious.
 - b) Intumescent.

3. Firestopping:

- a. Use one of the following:
 - 1) any noncombustible type allowed by code.
- b. Do not use:
 - 1) any combustible type.

END OF CHAPTER B1

CHAPTER C14**OTHER INTERIOR OPENINGS****PERFORMANCE****A. Basic Function:**

1. Provide interior openings between adjacent spaces when required for air movement, louvered where required for visual privacy, baffled where required for acoustical isolation, and equipped with automatic fire dampers where separations are fire-rated.
2. Provide interior openings where required for maintenance access to mechanical services and other concealed systems, designed to be as unobtrusive as possible.
3. Provide covers for interior expansion joints that protect joints from debris, provide safe and durable support for anticipated traffic, and minimize visual discontinuity with adjacent surfaces.
4. Other interior openings comprise the following elements:
 - a. Louvers and vents.
 - b. Access doors and panels.
 - c. Hatches.
 - d. Expansion joint covers.
 - e. Elements forming or completing interior openings, including sills, jambs, heads, and operating hardware.
5. Where other interior openings are integral with elements defined within another element group, meet requirements of both element groups. Interior openings between adjacent spaces must not degrade performance of partitions and other interior construction elements below the levels specified.
6. In addition to requirements of this Chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter C - Interiors, and Chapter C1 - Interior Construction.

B. Amenity and Comfort:

1. Air Movement: Provide properly sized and located interior openings where required for natural ventilation specified in Chapter C.
 - a. Include method for restricting or eliminating air movement at occupants option.
 - b. Include method for adjusting and directing air flow while maintaining visual privacy.
2. Return Air Movement: Do not provide openings between adjacent spaces to accommodate air return where forced air heating and air conditioning systems are employed; provide for ducted air return. ***Either above ceiling return air plenums or ducted returns are acceptable.***
3. Visual Privacy: Where air movement is required between adjacent spaces, provide interior openings equipped with sightproof louvers where required for protection of visual privacy.
4. Acoustical Privacy: Where air movement is required between adjacent spaces specified to be acoustically isolated, provide sound attenuators that will maintain NIC values specified in Chapter C1.
5. Convenience:
 - a. Dimensions: Provide access panels or hatches that are sized appropriately for access to spaces, materials, services, and utilities concealed by other construction.
 - b. Features: Provide access panels and hatches with concealed hinges, recessed latch, keyed cylinder, and hold-open device.
6. Appearance:
 - a. Compatibility: Provide access panels, hatches, and louvers that are compatible in appearance with the finished surfaces in which they are installed, employing similar colors,

and textures.

- b. Frames: Design frames to give a flush or nearly flush appearance.

C. Health and Safety:

- 1. Fire Resistance of Elements Closing Openings: As required by code.
- 2. Fire Resistance of Elements Closing Openings: Not less than fire resistance of construction in which the assembly is installed.
- 3. Tripping Hazard: Provide floor expansion joint covers and floor hatches that are flush with finished floor surface or lapped not more than 1/4 inch above finished surface with tapered edges to present minimal tripping hazard.

D. Structure:

- 1. Vehicular Expansion Joint Covers: Provide expansion joint covers capable of supporting minimum 4000 lb/linear ft at fully expanded position without damage.
- 2. Pedestrian Expansion Joint Covers: Provide expansion joint covers for interior floors capable of supporting minimum 300 lb/linear ft at fully expanded position without damage.
- 3. Floor Hatches in Vehicular Areas: Provide floor hatches for warehouse, garage, and driveways capable of supporting minimum live load of 200 psi without permanent deflection.
- 4. Floor Hatches in Pedestrian Areas: Provide floor hatches for interior floors capable of supporting minimum live load of 150 psf without permanent deflection.

PRODUCTS

A. Louvers and Vents (10200):

- 1. Use the following:
 - a. Metal louvers matching other metal fabrications.
- 2. Do not use:
 - a. Prefabricated wood louvers.
 - b. Custom fabricated wood louvers.

B. Access Doors:

- 1. Use the following:
 - a. Manufactured metal doors (08300).
 - b. Custom fabricated metal doors (08300).
- 2. Do not use:
 - a. Custom fabricated wooden doors.

C. Floor Hatches:

- 1. Use one of the following:
 - a. Manufactured metal hatches (08300).
 - b. Custom fabricated metal hatches (08300).
- 2. Do not use:
 - a. Custom fabricated wooden hatches.

D. Expansion Joint Covers:

- 1. Use the following:
 - a. Manufactured all-metal covers (05800).
 - b. Manufactured metal covers with resilient filler (05800).

METHODS OF CONSTRUCTION

- A. Construct other interior openings using the following methods and techniques:
 - 1. Field installation of prefabricated closure elements in site-fabricated openings for louvers and vents; for access panels; for floor hatches; and for expansion joint covers.
- B. Do not use:
 - 1. Shop installation of prefabricated closure elements for louvers and vents and for access panels.
 - 2. Shop installation of shop fabricated closure elements for louvers and vents and for access panels.

END OF CHAPTER C14

CHAPTER C16**INTERIOR FINISHES****PERFORMANCE****A. Basic Function:**

1. Provide appropriately finished interiors for all spaces required by the program.
2. Interior finishes comprise the following elements:
 - a. Wall finishes, including those applied to the interior face of exterior walls and to the vertical faces of superstructure elements.
 - b. Floor finishes, except for access floors.
 - c. Suspended ceilings and soffits.
 - d. Applied ceiling finishes.
 - e. Stair finishes, except for integral stair surfaces.
 - f. Finishes applied to other interior surfaces.
3. Manufacturer's standard performance guarantees or warranties that extend past 12 month period shall be provided for tile, acoustical tile, or other like materials.
4. Provide manufacturer's standard performance guarantee or warranty including 10 year wear warranty, 2 year material and workmanship, and 10 year tuft bind and delamination.
5. Where interior finishes are integral with elements defined within another element group, meet requirements of both element groups.
6. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter C - Interiors, and Chapter C1 - Interior Construction.

B. Amenity and Comfort:

1. Thermal Performance:
 - a. Interior Wall Finishes at Exterior Walls: Provide vapor permeance of 1 perm maximum when tested in accordance with ASTM E 96-2000.
 - b. Interior Ceiling Finishes at Roof Level: Provide vapor permeance of 1 perm maximum when tested in accordance with ASTM E 96-2000.
2. Reflectivity:
 - a. Glare: Provide interior finishes that will not result in discomfort glare due to excessive contrast with light sources.
 - 1) Ceiling Surfaces: Not less than 80 percent reflectivity, when measured in accordance with ASTM E 1477-1998a.
 - 2) Wall Surfaces: Not less than 50 percent reflectivity.
 - 3) Floor Surfaces: Not less than 30 percent reflectivity.
 - 4) Exceptions: SR Resident/Occupant Services, SS Storage, SV Vehicular, SC Circulation, and SU Utility spaces.
 - b. Specular Reflections: Provide interior finishes that will minimize specular reflections.
3. Acoustical Performance:
 - a. Sound Absorption: Provide acoustical absorption within interior spaces to achieve reverberation times within the limits specified in Chapter C - Interiors.
 - b. Articulation Class: For open office areas, open plan classrooms, and conference rooms, provide ceilings that have been tested per ASTM E 1111-1992(R96) to provide Articulation Class (AC) values not less than 150.
 - c. Sound Isolation: In areas where interior partitions stop at the ceiling and a plenum space extends above, provide ceilings tested in accordance with ASTM E 1414-2000a and classified in accordance with ASTM E 413-1987(R99) to provide minimum Ceiling Attenuation Class (CAC) values as follows:

- 1) Similar Functions and NC Levels on Both Sides of Partition: CAC 40.
 - 2) Quiet Space (NC 20-30) Separated From Moderately Noisy Space (NC 30-40): CAC 45.
 - 3) Quiet Space (NC 20-30) Separated From Noisy Space (NC 40-50): CAC 50.
 - 4) Quiet Space (NC 20-30) Separated From Very Noisy Space (NC 50-60): CAC 55.
 - 5) Moderately Noisy Space (NC 30-40) Separated From Noisy Space (NC 40-50): CAC 45.
 - 6) Moderately Noisy Space (NC 30-40) Separated From Very Noisy Space (NC 50-60): CAC 50.
 - 7) Noisy Space (NC 40-50) and Very Noisy Space (NC 50-60): CAC 45.
4. Cleanliness:
- a. For spaces such as toilet rooms, maintenance rooms, and showers, provide wall, ceiling, and floor surfaces that are inherently resistant to moisture and that can be cleaned by caustic agents without damage.
- C. Health and Safety:
1. Slip Resistance: For spaces subject to floor wetting, including entry lobbies, provide floor finishes with inherent slip resistance under wet conditions.
 - a. At building entries, provide means for reducing or minimizing moisture and debris on shoe soles.
 - b. At spaces such as wet areas, toilets and maintenance rooms, provide floor surfaces with minimum static coefficient of friction of 0.60 when wet, measured in accordance with ASTM C 1028-1996 or ASTM D 2047-1999.
 2. Slip Resistance: At stairs and corridors, provide floor finishes with minimum static coefficient of friction of 0.60, measured in accordance with ASTM D 2047-1999.
 3. Slip Resistance: At ramps, showers, steam rooms, and sloped floor surfaces, provide floor finishes with minimum static coefficient of friction of 0.80, measured in accordance with ASTM D 2047-1999.
 4. Tactile Warning Surfaces: Provide floor surfaces that comply with ADAAG-1994 detectable warning requirements at potentially hazardous locations, including top and bottom of stairs, top and bottom of ramps, and edge of loading dock.
 5. Flammability:
 - a. Ceilings in Exits and Corridors: Provide ceilings with ratings not greater than the following, when tested in accordance with ASTM E 84-2001:
 - 1) Flame Spread: 25.
 - 2) Smoke Developed: 450.
 - b. Walls in Exits and Corridors: Provide wall surfaces with ratings not greater than the following, when tested in accordance with ASTM E 84-2001:
 - 1) Flame Spread: 25.
 - 2) Smoke Developed: 450.
 - c. Floors in Exits and Corridors: Provide floor surfaces with ratings not greater than the following:
 - 1) Critical Radiant Flux of 0.45 W/sq. cm, per ASTM E 648-2000.
 - 2) Smoke Density: 450 or less specific optical density, per ASTM E 662-2001.
 - d. Ceilings in Primary Spaces: Provide ceilings with ratings not greater than the following, when tested in accordance with ASTM E 84-2001:
 - 1) Flame Spread: 25.
 - 2) Smoke Developed: 450.
 - e. Walls in Primary Spaces: Provide wall surfaces with ratings not greater than the following, when tested in accordance with ASTM E 84-2001:
 - 1) Flame Spread: 25.
 - 2) Smoke Developed: 450.

- f. Floors in Primary Spaces: Provide floor surfaces with ratings not greater than the following:
 - 1) Critical Radiant Flux of 0.45 W/sq. cm, per ASTM E 648-2000.
 - 2) Smoke Density: 450 or less specific optical density, per ASTM E 662-2001.
- D. Structure:
 - 1. Floor Loading: Provide floor finishes at warehouse and storage areas that are capable of withstanding static loading of 125 psi without permanent deformation.
- E. Durability:
 - 1. Wall Finishes: Provide integral or applied wall surfaces that are appropriate for anticipated usage and traffic, offering durability not less than would be provided by applied wall coverings as follows, classified in accordance with ASTM F 793-1993 (R98):
 - a. SP1 Customer Contact: Category II-Decorative with Medium Serviceability.
 - b. SP2 Occupant Work: Category IV- Type I Commercial Serviceability.
 - c. SP3 Equipment Utilization: Category V- Type II Commercial Serviceability.
 - d. SP6 Meeting and Instruction: Category V- Type II Commercial Serviceability.
 - e. SP7 Special Facilities: Category VI- Type III Commercial Serviceability.
 - f. SR1 Sanitary Facilities: Category V- Type II Commercial Serviceability.
 - g. SR2 Clothing, Locker Facilities: Category IV- Type I Commercial Serviceability.
 - h. SS1 Closets: Category 1-Decorative Only.
 - i. SS2 Storage Rooms: Category IV- Type I Commercial Serviceability.
 - j. SS3 Heavy Storage: Category V- Type II Commercial Serviceability.
 - k. SV1 Automotive: Category VI- Type III Commercial Serviceability.
 - l. SC1 Corridors: Category VI- Type III Commercial Serviceability. SC2 Lobbies:
 - m. SC3 Waiting Areas: Category V- Type II Commercial Serviceability.
 - n. SC4 Stairs: Category V- Type II Commercial Serviceability.
 - o. SU1 Maintenance Facilities: Category V- Type II Commercial Serviceability.
 - p. SU2 Utility Equipment Rooms: Category V- Type II Commercial Serviceability.
 - 2. Interior Wall Finishes at Exterior Walls: Provide surfaces that will not be damaged by incidental condensation from windows.
 - 3. Wall Protection: In corridors, freight receiving rooms, and other vulnerable areas, provide impact resistant wall bumpers, and corner guards or wall surfaces that are inherently resistant to impact damage due to rolling carts, hand trucks, and equipment.
 - 4. Opening Protection: At partition openings intended to accommodate pedestrian, vehicular, or equipment traffic, provide protection of opening edges in the form of door frames (cased openings), or corner guards.
 - 5. Flooring: Provide floor finishes that are appropriate for anticipated usage and traffic in each area, based on a 15 year replacement cycle.
 - a. Substantiation:
 - 1) Design Development: In addition to items of proven-in-use substantiation specified in Chapter III, provide, for minimum of 3 existing applications, date of installation of floor covering; maintenance, repair, and replacement history; recommended inspection and maintenance program; detailed evaluation of similarities and differences of historical application from proposed application; estimated life span of similar assembly if constructed today.
 - 2) Design Development: As specified for service life span in Chapter III, including service life analysis and life cycle cost analysis.

PRODUCTS

A. Design and construct interiors using the following materials and systems:

1. Ceramic mosaic tile (09300).
2. Glazed wall tile (09300).
3. Quarry tile (09300).
4. Acoustical panel ceilings (09500).
5. Acoustical metal pan ceilings (09500).
6. Resilient sheet flooring (09600).
7. Resilient tile flooring (09600).
8. Fluid-applied flooring (09600).
9. Sheet carpet, glued-down (09600).
10. Vinyl-coated fabric wall covering (09700).
11. Wall fabrics (09700).
12. Acoustical wall treatment (09800).
13. Interior paints (09900).
14. High performance coatings (09900).
15. ***Carpet Tile (09680)***

B. Do not use:

1. Paver tile.
2. Portland cement terrazzo.
3. Precast terrazzo.
4. Thinset epoxy terrazzo.
5. Thinset polyacrylate terrazzo.
6. Acoustical tile ceilings.
7. Luminous ceilings.
8. Linear metal ceilings.
9. Linear wood ceilings.
10. Athletic flooring.
11. Plastic laminate flooring.
12. Brick flooring.
13. Stone flooring.
14. Cushioned wood flooring.
15. Wood parquet flooring.
16. Wood strip flooring.

17. Sheet carpet, stretched-in.
18. ~~Carpet tile.~~
19. Wallpaper.
20. Flexible wood veneer wall covering.
21. Stone facing.

METHODS OF CONSTRUCTION

- A. Construct interior finishes using the following methods and techniques:
 1. Field apply finish materials to interior construction elements as follows:
 - a. Throughout the project.
- B. Do not use:
 1. Integrally finished interior construction elements.
 2. Factory applied interior finishes.

END OF CHAPTER C16

CHAPTER C17A**SCIF (FREIGHT TRANSFER FACILITY)****PERFORMANCE****A. Basic Function:**

1. Provide space for "Sensitive Compartmented Information Facility" (SCIF) for Classified Cargo storage and processing separated from the General Cargo processing area.
2. The SCIF shall be designed and constructed in accordance with Director of Central Intelligence Directive (DCID) 6/9 "Physical Security Standards for Construction of Sensitive Standards for Construction of Sensitive Compartmented Information Facilities."
3. Administrative SCIF: There is also need to conduct classified communication from within this facility. The administrative SCIF shall be designed and constructed in accordance with DCID 6/9 which supersedes DAIM 50-3 for SCI related issues.
4. Where interior construction elements also must function as elements defined within another element group, meet requirements of both element groups.
5. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance and Chapter C - Interiors.

B. Amenity and Comfort:

1. Convenience:
 - a. The SCIF shall accommodate 10 436L pallets (108" x 88" x 96" high) and a forklift to move them around the room. The SCIF shall have space for building and breaking-down pallets. Provide accommodations for six pallet positions on a roller system and four to six pallet positions on open floor space.
 - b. The SCIF shall also have space for the administrative processing of material, including mission planning and preparation, and packaging material storage shelving. The administrative SCIF will also conduct classified communication from within this facility. The communications facility criteria is described in ITSTD-001A, "Comm Secure Communications Facility Standard Document (SCFSD), Feb 2000; NSTISSI No. 7003 "Protected Distribution Systems".
2. Sound Levels: Provide administrative interior construction for the SCIF areas to achieve an STC 45 sound rating. The perimeter exterior walls need to be STC 45 rating as well.
3. Comfort: HVAC shall provide for normal office temperature. Special consideration shall be given to location of ducts and vents and the operation of the HVAC system to avoid false alarm activation when the facility is unoccupied. Any penetrations such as for ventilation ducts in excess of 96 square inches (with one edge greater than six inches) shall be blocked with bars, grilles, or baffles or an approved intrusion detection system shall be installed. An access port shall be installed to allow visual inspection of the protection in the vents and ducts.
4. Intrusion Detection System:
 - a. The SCIF must have an Intrusion Detection System (IDS) that is tied into the Dover AFB Security Office Monitoring System (base uses ADT). The IDS telephone line shall be 128-bit encryption and needs to meet NIST 197 Standards. The System shall have Class 1 digital encryption system (DES) line supervision, capability of real-time logging, be compatible with fiber optic telephone line system, provide multi-level noise immunity, electrical transient suppression, and the use of unconditioned, electrical ground isolated signal/telephone lines, use on-board modems for communications, have automated resynchronization of the secured area premise control, duress switches for secure areas (one for each entrance into the SCIF(s) to include the roll up door), passive infrared/ultrasonic sensors for volumetric coverage, high security balanced magnetic

switches (triple biased) (meeting minimum standards of UL 634) for roll-up and personnel doors, capacitance grid for any HVAC or other penetrations over 90 square inches, standby battery (6 hours), with a receiver console and monitor rack for annunciation point, individual alarm annunciation, line conditioner and annunciation point, power supply operational with 115v/60hz AC. Cabling between sensors and the Premise Control Unit (PCU) shall be dedicated to the intrusion detection equipment (IDE). When an alarm zone is placed in the maintenance mode, this condition shall be signaled automatically to the monitor station. The IDS shall not be securable while in the maintenance mode. The IDE shall not contain any capability for remote diagnostics, maintenance, or programming, except for an alarm remote test feature at the monitor station. A self-test feature shall be limited to one second per occurrence. Emergency power shall comply with UL 603. Provide illuminated indication at the PCU of the power source in use and a signal to the monitor control station both visibly and audibly for a failure of a power source, a change in power source, and location of the failure or change. All IDE within the SCIF(s) with removable covers shall be equipped with tamper switches. Tamper detection shall be monitored continuously whether the IDS is in the access or secure mode of operation. No IDE shall be employed that allows audio and intelligence bearing signals to pass out of the SCIF(s) in any form. All sensors protecting the SCIF(s) shall be installed within the SCIF(s). Access/Secure switch and PCU: There shall be no capability to change the access status of IDS from locations outside the SCIF unless performed by a properly accessed individual. PCUs shall be located in the SCIF(s), near the entrance. Operation of the PCUs shall be restricted by use of a device that verifies authorized use. In the secure mode, any unauthorized entry into a SCIF shall cause an alarm to be transmitted immediately to the monitor station. A failed detector shall cause an immediate and continuous alarm condition. Detection equipment shall be installed in compliance with UL 2050, 681 and 1076. BMS on personnel doors shall be installed in such a manner that an alarm signal will initiate before the non-hinged side of the door opens beyond the thickness of the door from the seated position. Emergency exit doors equipped with integrated safety hardware may have the life safety alarm component integrated into the SCIF IDS as an additional detector. All IDE shall be installed in a manner to prevent access or removal from a location external to the SCIF and in compliance with UL 681 for "Installation of Burglar Alarm Equipment". ONLY U.S. CITIZENS SHALL DESIGN AND INSTALL THE INTRUSION DETECTION SYSTEM.

C. Health and Safety:

1. Fire Resistance: Provide interior construction to achieve fire resistance by code.

D. Structure:

1. Walls:

- a. Interior walls shall be CMU (uncertified and non-reinforced).
- b. Exterior walls shall be CMU and shall have a minimum of 0.05 percent vertical reinforcement with a maximum spacing of 48 inches (this is a force protection requirement).
- c. All walls to have painted finishes.
- d. There shall be no columns or posts in the SCIF.

2. Floors:

- a. Floors shall be concrete treated to prevent concrete dust and shall be non-skid.

3. Ceiling:

- a. For the Security Storage Area, provide exposed roof structure, insulation and roofing above. No ceiling is required.
- b. For the office, break room, bunk room, and toilet and shower room, provide 5/8 inch painted, gypsum board ceilings, attached to steel support system. Ceiling height shall be 9'-0". Design ceilings and walls of these rooms so that SCIF personnel will be able to view

the space above ceiling structure and below the roof to detect any forced intrusion into the Freight Transfer Facility.

4. Vertical Clearance:
 - a. Provide over 15 feet clearance from floor to ceiling lights, sprinklers, and vents to allow for pallet build-up and breakdown.
5. Crypto (Communications Equipment Room):
 - a. Design as a SCIF within a SCIF. Ceiling height shall be 10'-0" clear to accommodate installation of communications equipment cabinets (by others).
6. Customer Service Vestibule:
 - a. Design as a public space. Design all walls, ceiling and floor in accordance with DCID 6/9 to resist intrusion into the SCIF.
7. Doors:
 - a. Pedestrian Doors: SCIF shall have one interior pedestrian door (connected to the administrative area). Any other doors shall be emergency exit-only with deadlocking panic hardware on the inside and with no hardware on the exterior. Exit-only doors shall be equipped with local annunciator in order to alert personnel working in the area that someone has exited the facility under emergency conditions. The SCIF pedestrian doors shall be equipped with automatic door closures. Pedestrian doors shall be solid core metal-clad fire doors a minimum of 16-gauge metal cladding and doors shall be a minimum of 1 3/4 inches thick. A GSA approved combination lock that meets Federal Specification FFL 2740 (Assistant Secretary of Defense letter dated 19 Oct. 93, Subject: Combination Locks for the Protection of Classified Material states the Mas-Hamilton X-07/08/09 lock is currently the only acceptable lock) shall be provided. All emergency doors shall have security crash bars installed with no external hardware.
 - b. Roll-up Doors: A roll-up door shall also be provided. This door shall be insulated and weather-stripped for weather proofing and noise attenuation. There shall be a minimum height clearance of 15 feet to accommodate a forklift with pallet. Roll-up door shall be a minimum of **16 18**-gauge steel. Minimum clearance width shall be 13 feet. Roll-up door shall be provided with hasp for high security padlocks on each side (inside) of door (two locks on the door). Recommend a hasp welded near bottom edge of door on each side matched up to a hasp welded on each side of the frame. Roll-up door shall be electric powered with safety closure mechanism and a manual means to open the door such as a chain or crank. **Provide steel diamond mesh gate on interior side of roll-up door for added security.**
8. All construction shall be done in manner such that visual evidence will occur when walls, ceiling, and roof are penetrated.
9. Roller System: A roller system for pallets will be furnished and installed by the Government. Rollers will be omni-directional to accommodate at minimum four 463L pallets. Roller system will begin immediately inside of the roll-up door. Roller system will accommodate forklift tines (recessed access) such that forklift can drive pallet directly into SCIF for loading.
10. Shelving: There shall be in the SCIF areas for segregating classified material and for storage of packaging and boxing materials: Built-in shelves along 2 walls (maximize shelving along walls). Shelving for packaging and boxing materials shall be 30" height o.c. and 30" deep. Shelving for classified material shall be 18" height o.c. and 24" deep.
11. Lighting and Duplex Outlets: Lighting throughout the SCIF shall be the same intensity as an office to allow couriers to read typed print. Light placement shall minimize the effect of shadows cast by pallets and other tall items stored in the SCIF. Entry point lighting must be controlled from the interior of the facility so only authorized individuals have access to the switch. Duplex outlets shall be provided every 10' along walls at a height of 4'.

AIR FREIGHT TERMINAL, DOVER AFB

PROJECT NUMBER: FJXT043003
REQUEST FOR PROPOSAL
SOLICITATION NO.: DACA61-03-R-0009
AMENDMENT NO. 0015

END OF CHAPTER C17A

CHAPTER C17B**Vault (SPECIAL HANDLING AREA)****PERFORMANCE****A. Basic Function:**

1. Provide space designated as "Security Cage" in the Special Handling Area for temporary storage of very high to low risk materials, including arms, ammunition, and explosives.
2. The Vault shall be designed and constructed in accordance with DOD 5100.76-M.
3. Where interior construction elements also must function as elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance and Chapter C - Interiors.

B. Amenity and Comfort:**1. Intrusion Detection System:**

- a. The Vault must have an Intrusion Detection System (IDS) that is tied into the Dover AFB Security Office Monitoring System (base uses ADT). The IDS telephone line shall be 128-bit encryption and needs to meet NIST 197 Standards. The System shall have Class 1 digital encryption system (DES) line supervision, capability of real-time logging, be compatible with fiber optic telephone line system, provide multi-level noise immunity, electrical transient suppression, and the use of unconditioned, electrical ground isolated signal/telephone lines, use on-board modems for communications, have automated resynchronization of the secured area premise control, duress switches for secure areas (one for each entrance into the Vault(s) to include the roll up door), passive infrared/ultrasonic sensors for volumetric coverage, high security balanced magnetic switches (triple biased) (meeting minimum standards of UL 634) for roll-up and personnel doors, capacitance grid for any HVAC or other penetrations over 90 square inches, standby battery (6 hours), with a receiver console and monitor rack for annunciation point, individual alarm annunciation, line conditioner and annunciation point, power supply operational with 115v/60hz AC. Cabling between sensors and the Premise Control Unit (PCU) shall be dedicated to the intrusion detection equipment (IDE). When an alarm zone is placed in the maintenance mode, this condition shall be signaled automatically to the monitor station. The IDS shall not be securable while in the maintenance mode. The IDE shall not contain any capability for remote diagnostics, maintenance, or programming, except for an alarm remote test feature at the monitor station. A self-test feature shall be limited to one second per occurrence. Emergency power shall comply with UL 603. Provide illuminated indication at the PCU of the power source in use and a signal to the monitor control station both visibly and audibly for a failure of a power source, a change in power source, and location of the failure or change. All IDE within the Vault(s) with removable covers shall be equipped with tamper switches. Tamper detection shall be monitored continuously whether the IDS is in the access or secure mode of operation. No IDE shall be employed that allows audio and intelligence-bearing signals to pass out of the Vault(s) in any form. All sensors protecting the Vault(s) shall be installed within the Vault(s). Access/Secure switch and PCU: There shall be no capability to change the access status of IDS from locations outside the Vault unless performed by a properly accessed individual. PCUs shall be located in the Vault(s), near the entrance. Operation of the PCUs shall be restricted by use of a device that verifies authorized use. In the secure mode, any unauthorized entry into a Vault shall cause an alarm to be transmitted immediately to the monitor station. A failed detector shall cause an immediate and continuous alarm condition. Detection equipment shall be installed in compliance with UL 2050, 681 and 1076. BMS on personnel doors shall be installed in such a manner that an

alarm signal will initiate before the non hinged side of the door opens beyond the thickness of the door from the seated position. Emergency exit doors equipped with integrated safety hardware may have the life safety alarm component integrated into the Vault IDS as an additional detector. All IDE shall be installed in a manner to prevent access or removal from a location external to the Vault and in compliance with UL 681 for "Installation of Burglar Alarm Equipment". ONLY U.S. CITIZENS SHALL DESIGN AND INSTALL THE INTRUSION DETECTION SYSTEM.

C. Health and Safety:

1. Fire Resistance: Provide interior construction to achieve fire resistance by code.

D. Structure:

1. Walls:
 - a. Perimeter walls shall be minimum 8-inch CMU (reinforced) in accordance with DOD 5100.76-M.
 - b. All walls to have painted finishes.
 - c. There shall be no columns or posts in the Vault.
2. Floors:
 - a. Floors shall be concrete treated to prevent concrete dust and shall be non-skid.
 - b. Construction in accordance with DOD 5100.76-M.
3. Ceiling:
 - a. Construction of ceiling/roof in accordance with DOD 5100.76-M.
4. Vertical Clearance:
 - a. There shall be no false ceilings.
 - b. Provide over 15 feet clearance from floor to ceiling lights, sprinklers, and vents to allow for pallet build-up and breakdown.
5. Doors:
 - a. Access Doors: Provide two GSA-approved, Class 5 Armory Vault Doors to meet Federal Specification AA-V-2737, with a built-in, three-position dial combination lock.
 - b. Roll-up Doors: A roll-up door shall also be provided. This door shall be insulated and weather-stripped for weather proofing and noise attenuation. There shall be a minimum height clearance of 15 feet to accommodate a forklift with pallet. Roll-up door shall be a minimum of **46 18** -gauge steel. Minimum clearance width shall be 13 feet. Roll-up door shall be provided with hasp for high security padlocks on each side (inside) of door (two locks on the door). Recommend a hasp welded near bottom edge of door on each side matched up to a hasp welded on each side of the frame. Roll-up door shall be electric powered with safety closure mechanism and a manual means to open the door such as a chain or crank. **Provide steel diamond mesh gate on interior side of roll-up door for added security.**
6. All construction shall be done in manner such that visual evidence will occur when walls, ceiling, and roof are penetrated.
7. Shelving: Built-in, 2 tier industrial grade shelves along 3 perimeter walls (maximize shelving along walls). Shelving shall have (1) bottom shelf and a second shelf at 36" above the floor slab. Shelving shall be 30" deep.
8. Lighting and Duplex Outlets: Lighting throughout the Vault shall be the same intensity as an office to allow couriers to read typed print. Light placement shall minimize the effect of shadows cast by pallets and other tall items stored in the Vault. Entry point lighting must be controlled from the interior of the facility so only authorized individuals have access to the switch. Duplex outlets shall be provided every 10' along walls at a height of 4'.

AIR FREIGHT TERMINAL, DOVER AFB

PROJECT NUMBER: FJXT043003
REQUEST FOR PROPOSAL
SOLICITATION NO.: DACA61-03-R-0009
AMENDMENT NO. 0015

END OF CHAPTER C17B

CHAPTER C18**HAZARDOUS MATERIAL STORAGE AREA****PERFORMANCE****A. Basic Function:**

1. Provide space for "Hazardous Materials Storage Area".
2. The Hazardous Storage Area shall be designed and constructed in accordance UFC 3-600-01 (17 April 2003) and NFPA 30 (Flammable and Combustible Liquids Code).
3. Where interior construction elements also must function as elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance and Chapter C - Interiors.

B. Amenity and Comfort:

1. Convenience:
 - a. Each storage room shall accommodate containers, in or on movable storage racks. Provide adequate aisle space for movement of fork lift with load. Also provide a minimum longitudinal flue space of 12 inches between double row racks and 9 inches between single row racks and the wall.
 - b. Provide roll-up 90 minute fire-rated doors at the ends of each room as well as 90 minute fire-rated doors for pedestrian egress.
2. Sound Levels: Provide only general warehouse STC sound rating.
3. Comfort: HVAC shall provide for general warehouse temperature, however there is requirement to maintain a continuous low level ventilation system to prevent accumulation of significant quantities of vapor-air mixture, in the event of a spill. Provide normal warehouse lighting.

C. Health and Safety:

1. Fire Resistance: Provide interior construction to achieve 2 hour resistance by IBC and UFC.
2. Provide automatic sprinkler protection. Ceiling and in-rack sprinklers must be designed in accordance with NFPA 30 and installed in accordance with NFPA 13.

D. Structure:

1. Walls:
 - a. Interior walls shall be CMU 2 hour rated except between hazardous material storage and the general cargo processing area shall be 4 hour rated. Walls shall extend from floor to underside of roof deck.
 - b. All walls to have painted finish.
 - c. There shall be no columns or posts in the hazardous material storage rooms.
2. Floors:
 - a. Floors shall be concrete treated to prevent concrete dust and shall be non-skid.
 - b. For each room provide a 16 inch x 16 inch x 60 inch to 72 inch deep concrete sump in the middle of the room. The sump shall have a capacity of at least 60 gallon. Provide a grate at the top of the sump to withstand the impact of a loaded forklift. The floor of each room shall slope to the sump 1/8 inch in 12 inches.
3. Ceiling:
 - a. Provide 5/8 inch gypsum board ceiling attached to support system which shall be attached to roof purlins.

4. Vertical Clearance:
 - a. There shall be no false ceilings.
 - b. Provide ~~over 15~~ **minimum 18** feet clearance, but not more than 30 feet clearance from floor to ceiling lights, sprinklers, and vents.
5. Doors:
 - a. Pedestrian Doors: Provide one 3 foot wide 90 minute fire-rated door at the ends of each room.
 - b. Roll-up Doors: Provide one 13 foot wide x 15 foot high, 90 minute fire-rated door at the ends of each room. Place roll-up doors off center of the wall and in alignment with roll-up door at opposite ends of the room. Provide fusible link on doors to automatically close doors in the event of fire.
6. Lighting and Duplex Outlets: Lighting throughout the hazardous material storage rooms shall be the same intensity as general warehouse lighting. Provide electric wiring and duplex outlets in accordance with code requirements.

END OF CHAPTER C18

CHAPTER C19**REFRIGERATED STORAGE AREA****PERFORMANCE****A. Basic Function:**

1. Provide a manufactured refrigerated room for the temporary storage of air cargo.
2. The room shall be designed to coordinate the transfer of cargo from the General Cargo Area with the Mechanized Material Handling System (MMHS).
3. Where construction elements also must function as elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of PART III - Facility Performance and Chapter C - Interiors.

B. Amenity and Comfort:

1. Convenience:
 - a. The room shall provide space for the storage and convenient movement of material within the Cold Storage Room.
 - b. Provide for MMHS equipment in the storage room that is used for the transfer of cargo.
 - c. Provide a space that will maintain a temperature of 40 Deg. Fahrenheit.

C. Durability:

1. Service life span 30 years.
 - a. Substantiation:
 - 1) Proposal: Identification of proven-in-use assemblies of the same type, for inspection by Dover AFB.
 - 2) Preliminary Design: Identification of proven-in-use assemblies of the same type, for inspection by Dover AFB.
 - 3) Design Development: Identification of actual products to be used.

D. Operation and Maintenance:

1. Provide training, operation and maintenance in accordance with Section 01701.
2. Ease of Maintenance: Not requiring any routine measures to maintain finish other than washing with soap and water.

E. Structure:

1. The room of 1400 square feet x ~~18~~ **10** feet clear height shall be constructed of manufactured panels for walls and roof by a company experienced in the production of refrigerated storage rooms.
 - a. Walls:
 - 1) Insulated panels of interior and exterior metal skins urethane insulation between the skins.
 - 2) Exterior Finish: Galvanized steel with sand tan polyester painted finish.
 - 3) Interior Finish: Stainless Steel.
 - b. Roof (ceiling):
 - 1) Same as for walls.
 - c. Floor:
 - 1) Base Slab: Concrete slab on grade.
 - 2) Insulation Layer: Urethane slab of Manufacturer's Standard thickness.
 - 3) Finish Floor: 4 inch concrete wearing surface slab with non-slip finish.
 - d. Doors:

- 1) Personnel Doors: Insulated stainless steel finish doors 3 foot wide.
- 2) Material Handling Doors: As required to move material into cold storage and out of storage via the MMHS.
- e. Refrigerating System:
 - 1) Provide system compatible with size room and the temperature to be maintained.
- f. Lighting:
 - 1) Provide vapor proof lighting to achieve foot candle rating in accordance with Chapter D61.

END OF CHAPTER C19

CHAPTER D**SERVICES****PERFORMANCE****A. Basic Function:**

1. Provide the following services:
 - a. Conveying Systems (D1): Mechanized means of conveying people and goods.
 - b. Water and Drainage (D2): Means of delivery of water to points of utilization; automatic heating and conditioning of domestic water; and unattended removal of water, rainwater, and liquid waste.
 - c. HVAC (D3): Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.
 - d. Fire Protection (D4): Automatic fire detection, suppression, and warning and manual fire-fighting equipment.
 - e. Electrical Power (D5): Energy to operate all electrically-operated devices, including those included under other services and those provided separately by the Dover AFB.
 - f. Artificial Lighting (D6): Means of illuminating spaces and tasks, both interior and exterior, independent of reliance on natural light.
 - g. Telecommunications (D7): Services that include voice and data transmission, telephone equipment, sound reinforcement, television reception, and television distribution.
 - h. Other Services (D9): Services that include integrated facility controls, surveillance and security controls, special grounding, and cathodic protection.
2. Utility Sources and Outlets:
 - a. Water Source: Existing public utility.
 - b. Sewage Disposal: Connect building sewer to the existing public sewage system.
 - c. Rain Water Drainage Outlet: Existing public utility storm drainage system independent of sanitary sewer; ~~into street at curb level.~~ **Rain water shall discharge underground to existing storm sewer system.**
 - d. Electrical Power Source: Existing Dover Air Force Base 12470/7200 volt grounded wye distribution system.
3. Where services elements must also function as elements defined within another element group, meet the requirements of both element groups.
 - a. Where services elements are located outside the building in the site area, meet applicable requirements of Chapters G3.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Part III.

B. Amenity and Comfort:

1. Artificial Illumination: Provide illumination for all interior spaces that is adequate in level and quality for comfortable performance of tasks typical for each space, regardless of the availability of natural light.
 - a. Light Levels: See Chapter D6.
 - b. Light Levels: Provide maintained ambient illuminance values for various activities that are within the ranges specified in the IESNA Lighting Handbook-2000, unless otherwise specified in this document.
 - c. Accent Lighting: In addition to general and task illumination, provide lighting on architectural features, displays, and artwork in focal areas to produce luminances that are within the range of 5:1 with respect to ambient background.
 - d. Substantiation:
 - 1) Design Development: Overall lighting scheme, including types of luminaires and lamps for primary spaces.

- 2) Construction Documents: Calculations of illuminance levels for representative spaces.
 - 3) Construction: Measurements of illuminance levels for representative spaces throughout the project, with a report setting forth results after correcting for maintenance factors keyed to luminaire design and lamp types.
2. Equipment Producing By-Product Heat: Ventilate housings and cabinets as required by equipment manufacturer and rooms and spaces as required to maintain specified environmental conditions.
3. Moisture: Prevent condensation from forming on service elements.
4. Airborne Sound:
 - a. Maintain the sound transmission characteristics of assemblies through which services must pass; comply with requirements of chapter where penetrated assembly is specified.
 - b. Prohibited Plumbing Noises: All sounds of flushing and of liquid running through pipes ("bathroom sounds") are prohibited outside of the rooms housing toilets, bathtubs, and showers, with the exception of when doors to those rooms are open.
 - c. Equipment Noises: Noise level below that which will be objectionable, based on occupancy of spaces.
 - d. When services are located within assemblies that perform sound isolation functions, consider the noise produced by the service itself as one of the external sound sources.
5. Structure-Borne Sound and Vibration: Prevent transmission of perceptible sound and vibration from services equipment that rotates, vibrates, or generates sound, by isolating such equipment from superstructure or by isolating equipment support foundations from building foundations.
 - a. Substantiation:
 - 1) Preliminary Design: Identification of sound- and vibration-generating equipment and method of isolation.
 - 2) Construction Documents: Details of isolation methods.
 - 3) Closeout: Measurement of sound transmitted through structure during functional performance testing and during full operation of all systems.
6. Cleanliness: Prevent accumulation of debris and dirt at floor mounted equipment, such as air handlers, chillers, pumps, switchgear, and panelboards by one or more of the following methods.
 - a. Provide 4 inch thick, concrete housekeeping pads.
 - b. Provide corrosion-resistant equipment stands.
 - c. Other reasonable methods acceptable to and approved by the Owner .
7. Odors: Eliminate, isolate, or exhaust odors produced by occupant functions and building services.
8. Appearance:
 - a. Conceal services elements from view to greatest extent possible, with exposed portions of simple, neutral design and color.
 - 1) Exception: Standard designs of manufacturers, without consideration for appearance, may be used for fire suppression sprinkler heads.
 - 2) Exception: Exposed portions are acceptable in SU1, SU2, and SV1 and cargo processing, storage and mechanized materials handling areas.
 - 3) Where exposed portions are acceptable, do not obstruct or diminish clear dimensions of doorways, windows, other operable openings, access panels and cabinet doors, or passageways, stairs, and other exitways.
 - 4) Where exposed piping is acceptable, install it close to walls and overhead structure, parallel and square to finished construction, plumb and nominally horizontal (except where required to slope for drainage).
 - b. Cover annular spaces around pipes, ducts, and conduits, where they pass through walls, ceilings, and floors with escutcheons or cover plates.

- 1) Exception: Escutcheons not required in SU1, SU2, and SV1 and cargo processing, storage and mechanized materials handling areas, provided annular spaces are filled completely.
- c. Mountings: On finished surfaces, use concealed attachments with cover plates, frames, or trim overlapping finishes.

C. Health and Safety:

1. Fire Safety:
 - a. Maintain fire resistance of walls, floors, ceilings, and other fire-rated assemblies that services must pass through, in accordance with requirements of the chapter in which the fire-rated assembly is specified.
 - b. Provide fire-rated separations between equipment rooms and other spaces where required, and as specified by, the code.
 - c. Combustible pipes may be used only where buried if outside building.
 - d. Substantiation for Combustible Materials, Where Allowed: UL listed or labeled, with flame spread and smoke developed ratings printed on product.
 - e. Provide products which are fire rated for the specific locations where they are installed.
2. Safety Hazards: Avoid using products that create safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code and the following:
 - a. Secure the approval of the air force base..
3. Excess Pressure: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.
4. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.
5. Hazardous Contents:
 - a. Flammable liquid storage locations are in designed storage areas, selected section of the vehicle and pallet storage area, and in fuel tank(s) for the generator.
 - b. Flammable gas storage locations are in designated storage areas, selected section of the vehicle and pallet storage area.
6. Electric Shock: Provide equipment which protects personnel from electrical shock.
7. Toxic Materials:
 - a. Lead: Do not use lead or lead-containing materials in potable water systems.
 - b. Lead: In solid materials (including pipe), maximum lead content of 8 percent; in solders and flux, maximum lead content of 0.2 percent.
8. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.
9. Flooding: See Part III for flood zone applicability.
10. Force Protection: Comply with Unified Facilities Criteria UFC 4-010-01 "DOD Minimum Anti-terrorism Standards for Buildings".

D. Structure:

1. Supports for Piping, Conduit, Ducts, and Components: Attached to, and supported by, the superstructure, not to or by non-structural construction or sheet metal elements, so that they do not move or sag, using the following:
 - a. Supports that allow movement of the rigid linear elements (pipe, etc.) without undue stress on the piping, tubes, fittings, components, or the superstructure.
 - b. Intermediate supports mounted between structural members to limit distance between supports.
 - c. Supports capable of handling seismic forces in accordance with the code.
 - d. Mounting frames, bases, or pads, designed for ease of anchorage or mounting.

- e. Rigid sway bracing at changes in direction of more than one-half of a right-angle, for all pipes.
 - f. Substantiation:
 - 1) Design Development: Details of supports, including engineering analysis.
 - 2. Structural Design of Components and Their Supports: In accordance with code.
 - a. Safety Factor for Component Structural Elements: Two; based on weight of component.
 - b. Anchors: Securely and positively attach all services components to superstructure.
 - 3. Concealed or Buried Components: Design cover or concealment so that components are not subjected to damaging stresses due to applied loads.
- E. Durability:
- 1. Expected Service Life Span: Same as the service life of the building, except as follows:
 - a. Ducts, Piping, and Wiring in All Services: Same as the service life of the building.
 - b. All Components Permanently Installed Underground or Encased in Concrete: Same as service life of building.
 - c. Conveying Systems: Minimum 30 years.
 - d. Plumbing:
 - 1) Shut-Off Valves and Similar Components: Same as service life of building.
 - 2) Electrically- and Fuel-Operated Equipment: Minimum 20 years.
 - 3) Other Moving Components: Minimum 20 years.
 - 4) Plumbing Fixtures: Same as building service life.
 - 5) Sink Faucets, But Not Other Fittings: Minimum 10 years.
 - e. HVAC:
 - 1) Shut-Off Valves: Minimum 20 years.
 - 2) Dampers, Louvers, Registers, Grilles: Same as service life of building.
 - 3) Main Heat Generation and Cooling Equipment: Minimum 20 years.
 - 4) Secondary Equipment: Minimum 20 years.
 - 5) Control Components, Except Wiring: Minimum 20 years.
 - f. Fire Protection:
 - 1) Pumps and Other Operating Components: Minimum 20 years.
 - 2) Fire Hoses: Minimum 20 years.
 - g. Electrical:
 - 1) Power Distribution Equipment: Same as building service life.
 - 2) Power Generation Equipment: Minimum 20 years.
 - 3) All Components of Life Safety-Related Systems: Minimum 20 years.
 - 4) Control Components, Except Wiring: Minimum 20 years.
 - h. Lighting Fixtures: Minimum 15 years.
 - i. Telecommunications Systems: Minimum 10 years.
 - j. Security and Surveillance Controls: Minimum 15 years.
 - k. Lightning Protection and Special Grounding Systems: Same as building service life.
 - l. Software and Firmware Integral to Operation of Services Equipment: Minimum 20 years functional life without reprogramming required.
 - 2. Weather Resistance:
 - a. All components exposed to outdoor environment must comply with the requirements of Chapter B; equipment enclosures are considered the equivalent of the exterior enclosure.
 - b. Liquid Storage and Distribution Components: Prevent freezing during longest duration of low temperature anticipated, based on historical weather data; if necessary, provide automatically controlled supplemental heating.
 - c. Buried Water Piping: Minimum of 6 inches below lowest recorded level at which the ground freezes.
 - d. Services Passing From Inside to Outside: Openings through shell sealed as required to meet performance specified, and using materials specified, in Chapter B.

3. Condensation: Provide drain pans and piping to remove condensation from cooling coils.
 4. Moisture Resistance: Where components are mounted to surfaces that are required to be moisture-resistant, seal mounting surface of components to finish surface so that moisture cannot penetrate under or behind component, using material that is not affected by presence of water, that is mildew-growth resistant, and that has a minimum service life of 10 years.
 5. Temperature and Humidity Endurance: Design equipment to endure temperature and humidity that will be encountered and to resist damage due to thermal expansion and contraction.
 6. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
 - a. Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
 - b. Piping Connections for Piping of Dissimilar Metals: Dielectric adapters.
 - c. Underground Elements: Provide supplementary protection for underground metal pipes, ducts, and conduits, sufficient to prevent corrosion completely, for the service life of the element without maintenance.
 - 1) 3 inches of concrete cover is considered to be permanent protection.
 - 2) Bituminous or other waterproof coating or wrapping is considered permanent protection unless cathodic protection is required and unless underground element is subject to movement due to structural loads or thermal expansion or contraction.
 - 3) Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements falling under these criteria:
 - a) Metal elements are submerged or buried in a soil environment known to cause corrosion on similar nearby structures.
 - b) Metal elements are submerged and buried in a soil environment in which stray DC electrical currents are present.
 - c) Metal piping carrying petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of piping.
 - d) Metal tank holding petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of tank.
 - 4) See Chapter D94 for cathodic protection requirements.
 7. Accidental Water Leakage: Locate components that would be damaged by water leakage from pipes or through foundations or roof out of likely paths of water and at least 8 inches above floor level.
 8. Abuse Resistance:
 - a. Buried Components: Minimum of 12 inches below surface of ground.
 - b. Underground Piping and Conduit: Watertight and rootproof.
 - c. Finishes on Exposed Components Subject to Touching by Occupants: Durable enough to withstand regular scrubbing using ordinary methods.
 9. Accidental Damage: Protect equipment and piping from accidental damage.
 10. Underground Piping Accidental Damage: Protect heating piping, chilled water piping, steam piping, condensate piping, and conduits from accidental damage with a warning tape buried 12 inches above the pipe.
- F. Operation and Maintenance:
1. Capacity:
 - a. Conveying Systems: As specified in the project program.
 - b. Water and Drainage: As required by code and as specified in Chapter D2.

- c. Heating, Cooling, and Ventilating: Maintain interior environment within ranges specified in Part III.
 - 1) Design HVAC to provide.
 - d. Fire Suppression: As required by code and as specified in Chapter D4.
 - e. Electrical: As required by code and as specified in Chapter D5.
 - 1) Power: The entire facility will be backed up by generator.
 - f. Telecommunications: As specified in project program.
 - g. Substantiation:
 - 1) Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
 - 2) Design Development: Engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements.
 - 3) Construction Documents: Complete system details.
 - 4) Construction and Closeout: Functional performance testing, as specified in Section 01780.
2. Efficiency:
- a. Energy efficiency as specified in Part III.
 - b. Water consumption as specified in Part III.
 - c. Substantiation: As specified in Part III.
3. Ease of Use:
- a. Provide software which is year 2000 compliant.
 - b. Access: All equipment located to allow easy access. Provide access doors for equipment accessed through walls, partitions, or fixed ceilings.
 - c. Valves and Other Control Devices: Accessible handles, switches, control buttons; valve handles on top/upper side; chain or other remote operators where located out of normal reach above floor level in SU1 and SU2 spaces.
 - d. Space Around Components: Working clearances and access routes as required by code and as recommended by component manufacturer.
 - e. Testing: After completion of installation, prepare services for starting-up by testing appropriately for proper operation.
 - f. Commissioning: Prepare services for use by eliminating operational anomalies, adjusting control systems for optimum operation, and demonstrating proper functioning, as specified in Section 01780.
 - 1) Substantiation:
 - a) ~~Proposal: General outline of commissioning procedures and responsibilities of the parties.~~
 - b) Design Development: Identification of systems and equipment to be tested and method of test. General outline of commissioning procedures and responsibilities of the parties.
 - c) Construction Documents: Complete commissioning plan.
 - d) Construction and Closeout: Commissioning reports.
 - g. Preparation for Operation: Provide assistance for the Dover AFB's preparations for operation, as specified in Section 00800 and as follows:
 - 1) Demonstration of all services to Dover AFB personnel.
 - 2) Training Dover AFB personnel in the operation of all service systems.
 - 3) Substantiation:
 - a) Construction Documents: Training plan and schedule.
 - b) Construction and Closeout: Documentation of training conducted.
4. Ease of Cleaning: Where not otherwise specified, design equipment mountings to allow easy cleaning around, and under, equipment, if applicable, without crevices, cracks, and concealed spaces where dirt and grease can accumulate and with raised, closed bases for equipment mounted on the floor.

- a. Provide equipment with removable access panels to allow cleaning.
5. Ease of Maintenance and Repair:
 - a. Piping Other Than Gravity Drains: Provide means of isolating convenient portions of piping system, so that small portions may be shut down leaving the remainder in operation and so that drainage of the entire system is not required to enable repair of a portion of it.
 - b. Piping: Entire systems drainable without disassembly of piping.
 - c. Above Ground Piping: Labeled to identify contents and direction of flow, each shut-off valve, each piece of equipment, each branch take off, and at 75 ft maximum spacing on exposed straight pipe runs.
 - d. Equipment in Piping Systems: Each unit provided with a union or flanged connector at each pipe connection to allow easy removal.
6. Ease of Equipment Service: As specified in Part III.
 - a. Lighting: Adequate for locating and operating equipment; emergency lighting for critical components.
 - b. Do not locate any equipment requiring maintenance in attics, in crawl spaces, where access must be through attics or crawl spaces, where access is not possible using removable panels or doors, or where access must be through toilet rooms used by more than one occupant.
 - c. Rooftop Equipment: Of type that is serviceable by relatively quick replacement of parts, minimizing time required on roof, and eliminating need to perform repair work in the weather.
 - d. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
 - e. Parts: Readily available from stocking distributors within 50 miles of project location.
 - f. Substantiation:
 - 1) Construction Documents: Identification of parts normally replaced during routine maintenance and parts replaced only when damaged or unexpectedly worn out; location of stocking distributors.
7. Maintenance Service: Maintain services as specified in Section 01701, including periodic inspections, routine maintenance recommended by manufacturers, and repair and replacement of defective elements; maintenance is required only for systems so specified.
8. Ease of Equipment Removal: Provide doors and corridors large enough for removal of major pieces of equipment, such as, air handlers, chillers, boilers, fans, coils, transformers, switchgear, water heaters, and storage tanks.
 - a. Substantiation:
 - 1) Preliminary Design: Identify locations of major pieces of equipment.
 - 2) Design: Submit the measurements of the major pieces of equipment and the path for removal from the building. Verify doors and corridors provide adequate clearance for removal of equipment.
 - 3) Construction Documents: Indicate sizes of doors and corridors used for removal of equipment. Indicate equipment sizes.

PRODUCTS

- A. Do not use:
 1. CFC-based refrigerants.
 2. Aluminum electrical conductors.
 3. PVC conduit, unless it is for grounding, or where PVC conduit is buried.

METHODS OF CONSTRUCTION

- A. The following existing services elements must be preserved:
 - 1. Existing sources of water and power for the structures, existing service elements that support other structures that are not in the scope of demolition work, and existing generator.
 - 2. Disconnect the generator and move it to a storage location on the base to be determined by the Dover Air Force Base.
- B. The following existing services elements must be removed to accomplish new construction:
 - 1. Existing asbestos and asbestos-containing insulation on pipes, ducts, and equipment.
 - 2. Existing service elements in the existing structures and on the site around the structures.

END OF CHAPTER D

CHAPTER D2**WATER AND DRAINAGE****PERFORMANCE****A. Basic Function:**

1. Provide delivery of hot and cold domestic water to points of utilization and the removal of water, rainwater, and liquid waste.
2. Water and drainage elements comprise the following:
 - a. Water Supply (D21): Water sources.
 - b. Plumbing Fixtures (D22): All fixtures necessary for sanitation, occupancy, and use, that are connected to water supply or drainage; not including water heating or conditioning equipment (D23) or kitchen appliances.
 - c. Domestic Water (D23): All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
 - d. Sanitary Waste (D24): All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment.
 - e. Rain Water Drainage (D25): All elements required for drainage of rain water from building areas in which it may accumulate and drainage of clear wastes from building services; not including gutters and downspouts (B31) or subdrainage (A).
3. Where plumbing elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
4. All plumbing work shall be in accordance with NAPHCC-01, unless otherwise stated and as specified hereinafter.
5. In addition to the requirements of this chapter, the construction will comply with requirements specified in Part III - Facility Performance and Chapter D - Services.

B. Amenity and Comfort:

1. Hot Water Supply:
 - a. Provide pressure balanced shower valves which limit the water temperature to 120 deg F.
 - b. Provide a master anti-scalding thermostatic mixing valve which limits the hot water supply temperature to 120 deg F.
2. Noise:
 - a. The system will be designed to prevent noise due to air trapped in piping systems.
 - b. Locate risers in dedicated and sound attenuated chases.
 - c. Fixtures will be selected to minimize noise.
3. Convenience:
 - a. Fixture Heights: As specified in code.
 - b. Fixture Configurations: As specified in code.
 - c. Water Connections: Hot water on the left side of fixtures and cold water on the right side of fixtures.
4. Odors:
 - a. Locate odor producing elements in areas separate from human occupancy in dedicated equipment rooms or outdoors.
 - b. Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
 - c. Connect fixtures to prevent entry of sewer gases into occupied spaces.
5. Appearance:
 - a. Vents: Conceal vents from view. Do not locate vents ~~on the front of the roof~~ **within 10**

feet from the edge of the roof..

C. Health and Safety:

1. Health: Provide safe and potable water from a safe source.
 - a. Public utility water is considered to be potable.
2. Waste Disposal: Each fixture will be connected to sanitary drainage system for proper disposal of waste and harmful materials.
3. Pressure Control: The system will be designed to control pressures to protect the building, fixtures, equipment, and occupants from harm.
 - a. Maximum Water Distribution Working Pressure: 60 psi.
 - b. Pressure Reduction: Provide pressure reducing valves or regulators.
 - c. Air Removal: Remove air trapped in water distribution system.
4. Prevention of Sewer Gas Leaks:
 - a. Provide waste system vents as required by code to avoid trap siphonage or compression.
 - b. The system design will prevent entry of sewer gases from the sanitary sewer into building's sewer system.
5. Protection of Potable Water Supply: As required by code.
6. Waste Drainage: Provide clear-water wastes; cooler floor drains; drinking fountains; air conditioning equipment; and water coolers with indirect waste pipe for drainage.
7. Burn Hazards:
 - a. Maximum Fixture Discharge Temperature: 120 degrees F.
 - b. Maximum Exposed Surface Temperature: 105 deg F.
8. Fire Hazards:
 - a. Do not use combustible piping materials inside the building.
 - 1) Terminate combustible piping entering the building within 5 feet of penetration.
9. Hazard Labeling: Clearly label domestic hot water; domestic cold water; domestic hot water return; rain water drainage; sanitary waste vent; and natural gas systems indicating the nature of contents and direction of flow.
 - a. Conform to requirements of ANSI/ASME 13.1-1996.
10. Hazardous Material Drainage: The construction will prevent damage to public utility drainage systems by removing hazardous materials before discharging.

D. Structure:

1. Insulated Pipes: The construction will prevent compression of insulation by using pipe shields or saddles or dense insulation inserts.

E. Durability:

1. Joint Durability: Provide watertight joints.
2. Electrical Component Protection:
 - a. Do not route piping through electrical rooms, switchgear rooms, transformer vaults, and elevator equipment rooms, and walk-in coolers and similar areas unless it is absolutely necessary.
 - 1) Where piping must be routed near electrical equipment, shield the electrical equipment with drip pans which drain to the nearest floor drain.
 - b. Substantiation: See tests specified under Operation and Maintenance.
3. Equipment Protection:
 - a. Domestic Water Distribution System: Provide a filtration device upstream of equipment which may be damaged by debris in the distribution system.

4. Maximum Discharge Temperature into Sewer: 120 degrees F.

F. Operation and Maintenance:

1. Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code and Chapter D21.
 - a. Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level.
 - 1) Use booster pumps. (Duplex system with bladder tank, quantity one for air freight terminal and quantity one for outside cargo facility.)
 - 2) Substantiation:
 - a) Design Development: Identification of pressure and flow requirements (design conditions) for the building; verification of source availability at design conditions.
 - b) Construction Documents: Equipment to be used to deliver water at design conditions; submit pump curves.
 - c) Construction: Test of system flow and pressure; submit report verifying performance.
 - b. Water Flow:
 - 1) Maximum Velocity: 8 fps at the design flow rate.
 - c. Water Supply Pressures:
 - 1) Service Main Working Pressure: shall be determined with water flow test.
 - 2) Water Distribution Working Pressure: 60 psi at 75 deg F.
 - d. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of water supply source and flow conditions.
 - 2) Design Development: Piping design calculations and entrance locations.
 - 3) Construction: Prior to installation of plumbing fixtures and prior to concealment of piping, air and water tests of piping systems at 150 percent of operating pressure, maintaining pressure for 4 hours to demonstrate system is watertight.
 - 4) Construction: Functional tests of fixtures and equipment.
 - 5) Occupancy: Observation of function during full occupancy simulating extreme conditions.
2. Waste Pipe Sizing:
 - a. The piping will be sized as required by code.
 - b. Building Drain: 4 inches diameter, minimum.
 - c. Buried Piping Below Slabs: 2 inches diameter, minimum.
 - d. Pipes 3 inches in Diameter and Smaller: Sloped at 1/4 inch per foot, minimum, downward in the direction of flow.
 - e. Pipes 4 inches in Diameter and Larger: Sloped at 1/8 inch per foot, minimum, downward in the direction of flow.
 - f. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of sewer discharge method and locations.
 - 2) Design Development: Drainage design calculations and documentation of piping outlets.
 - 3) Construction: Air and water pressure tests of piping systems; functional tests of drains and equipment under simulated full occupancy loads.
 - 4) Occupancy: Observation of function during full occupancy simulating extreme conditions.
3. Rain Water Drainage Capacity: As specified in the code and as follows:
 - a. Design Rainfall Rate: Short storm intensity of 3.1 inches per hour.
 - b. Secondary Drainage: Where required by code. Provide secondary roof drains connected to a secondary drainage system; scuppers in parapets.
 - c. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of rain water discharge methods

- and locations.
- 2) Design Development: Drainage design calculations and documentation of piping outlets.
 - 3) Construction: Air pressure test to verify continuity of piping; functional tests of each drain.
 - 4) Occupancy: Field observation of performance during at least two storms.
4. Ease of Maintenance and Repair:
- a. Provide devices as shown on the drawings which allow insertion of measurement devices to monitor flow and pressure levels in the water distribution system.
 - b. Isolation of Piping Segments and Equipment: Provide a means of isolating the following:
 - 1) Each building from main water service. Provide a shut-off valve located inside a valve box whose removable access cover is at grade level.
 - 2) Water meter from building piping.
 - 3) Each space from building service, excluding locations where there is only one fixture with its own isolation valves.
 - 4) Each water branch from main service.
 - 5) Each vertical riser from piping below.
 - 6) Each water branch to fixtures or equipment from main vertical riser.
 - 7) Piping lower than the supply, to prevent unnecessary draining in the case of disconnection.
 - 8) Each plumbing fixture, storage tank, and item of equipment, so that removal of one will not necessitate shutdown of others.
 - 9) Individual fixtures and equipment. Provide an isolation device within 3 feet of pipe connection to item.
 - c. Provision for Drainage of Water Distribution Piping:
 - 1) Slope Piping Toward Drain: 1/4 inch per 10 feet.
 - 2) Provide an adequately sized drain for the volume of water inside the distribution system.
 - 3) Drain valve (or fixture shut-off valve) located at each low point.
 - d. Provision for Cleaning of Drainage Piping: Provide a cleanout as required by code and as follows:
 - 1) At the upstream end of each horizontal sanitary drainage pipe, for cleaning in direction of flow.
 - 2) At the dead end of each dead-end pipe.
 - 3) Pipe 3 inches and Smaller: At intervals of 50 foot, maximum.
 - 4) Pipe 4 inches to 6 inches: At intervals of 80 foot, maximum.
 - 5) Pipe 8 inches and Larger: At intervals of 100 foot, maximum.
 - 6) Clearance: As required by code to allow for cleaning and rodding of pipe.
 - e. Spill containment pits with removable heavy duty grates are required in the following areas:
 - 1) Hazardous materials areas.
 - 2) Adjacent to each cargo scale.
 - f. Spill containment pits shall have no drain and piping at the base of the pit. The intention is for the Air Force Base to provide a sump pump in the event of a spill to pump the spilled material into a 55 gallon container provided by the Air Force Base.
 - g. Inside surfaces of the pits shall be coated with acid resistive materials.

PRODUCTS

- A. Provide the following:
1. As will be described in sections D21, D22, D23, D24 D25 and D29.
- B. Do not use:
1. Plastic piping of any type.
 2. Plastic piping inside the building.

METHODS OF CONSTRUCTION

A. Use the following practices and procedures:

1. Health: Maintain the safety of the potable water source at all times.
 - a. Do not connect the potable water source to any non-potable water source.
 - b. Keep animals and vermin out of open pipes, tanks, and other system components.
 - c. Keep other contaminants out of the distribution systems, equipment, and water source.
 - d. Do not connect private potable water source to public potable water source.

END OF CHAPTER D2

CHAPTER D21

WATER SUPPLY

PERFORMANCE

A. Basic Function:

1. Provide multiple water supplies necessary for building occupancy and use, and for future expansion in **Marshaling** yard area future addition. **Multiple water service includes separate domestic and fire services to the main AFT and to the Outsized Cargo/DCS/FTF/CDF facility.**
2. Capacity: Size the water supply in accordance with code.
3. Capacity: Size the water supply to exceed code by 40 percent.
4. Where water supply elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.
5. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D2 - Water and Drainage.

B. Health and Safety:

1. Fire Prevention: Provide **dedicated** water supply for fire sprinkler system and standpipes.
2. Disease Prevention: Provide potable water supply with backflow preventers in accordance with code and filtration to remove pollutants.
3. **Bacteriological results as of December 2003: Free Chlorine residual is distribution system: 0.6-1 ppm; Orthosphospate Level: N/A; pH range: 7.5 – 7.6. See Attachment 1 to this chapter for detailed sampling results.**

C. Durability:

1. Expected Service Life Span: 20 years.
2. Wear Resistance: Provide shutoff valves that are resistant to corrosion, breakage, and scratching due to continual contact with water, human usage, and cleaning with abrasive materials.
3. Freeze Protection: Protect piping from freezing with heat tracing.

D. Operation and Maintenance:

1. Water Pressure: 35 psi, minimum, except as otherwise required by code.
2. Ease of Service: Provide a shutoff valve at the the utility service main and the service entry point.
3. Ease of Repair: Do not locate underground piping beneath electrical service, equipment, footings, or foundation walls..

PRODUCTS

A. Pipe:

1. Use one or more of the following:
 - a. Ductile iron.
 - b. Galvanized steel.
 - c. Black steel
 - d. Cast iron
 - e. Copper.

f. Polyvinyl chloride (PVC)

2. Do not use : Arcylonitrile butadiene styrene (ABS)

END OF CHAPTER D21

CHAPTER D22**PLUMBING FIXTURES****PERFORMANCE****A. Basic Function:**

1. Provide plumbing fixtures necessary for occupancy, use, and sanitation.
2. Fixtures Required: As specified by code.
 - a. Lavatories: At public and private restrooms and bathrooms.
 - 1) Provide solid surface material counter type lav with seamless bowls.
 - 2) Do not use group lavatories.
 - b. Kitchen Sinks: Single compartment; one in each breakroom.
 - c. Utility Sinks: One in each janitor's closet.
 - d. Drinking Fountains: Minimum of one on each floor and within 10 feet of each public restroom.
 - e. Utility Water Supply: One in each SU1 space.
 - 1) Outdoor Supplies: Not more than 50 feet apart on building facade, one on each facade of building and next to mechanical room entrances.
3. Fixtures Required: As specified by code.
 - a. Lavatories: One in each private bathroom.
 - b. Kitchen Sinks: Single compartment; one in each breakroom.
 - c. Laundry Sinks: One in each utility room.
4. Where plumbing fixture elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.
5. Water supply, backflow prevention with strainer and drainage at Army installations will comply with the National Standard Plumbing Code [National Association of Plumbing-Heating-Cooling Contractors (NAPHCC), P. O. Box 6808, Falls Church, VA 22046] and other national codes.
6. Design for the physically handicapped. Appropriate modifications to plumbing fixtures as required by Uniform Federal Accessibility Standards shall be included in all projects designated to be suitable for access by the physically handicapped.
7. Fixture descriptions shall be as described by the American Society of Mechanical Engineers, ASME A112.19, or other equivalent commercial item descriptions.
8. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D2 - Water and Drainage.

B. Amenity and Comfort:

1. Convenience:
 - a. Provide space between and around fixtures.
 - b. Provide space between and around fixtures as required by code.
 - 1) 20 inches to walls or partitions measured from the centerline of the fixture.
 - 2) 20 inches in front of the fixture.
 - c. Faucets: Single action operation in the following locations.
 - 1) Lobby restrooms.
 - 2) Restrooms.
 - 3) Breakroom.
2. Appearance:
 - a. Smooth, corrosion-resistant, non-absorbent, with no crevices to collect dirt.
 - b. Aesthetically pleasing and easy and comfortable to use.
 - c. Color: As specified by the Architect, except where metal fixtures are required.

C. Health and Safety:

1. Burning Hazard: Protect wheelchair occupants from hot water pipes and drains.
2. Disease and Infection:
 - a. No overflow outlets in lavatories or sinks.
 - b. All openings and edges around the sides and bottom of each fixture permanently sealed with waterproof material.

D. Structure:

1. Fixtures will be anchored to support weight of fixtures and a minimum of 400 pounds without failure or stress on the connecting pipes.
2. Wall Mounted Fixtures: Carriers concealed inside fixture and in wall or floor.

E. Durability:

1. Expected Service Life Span of Faucet Valves: 10 years.
 - a. Substantiation: Manufacturer's unconditional warranty.
2. Expected Service Life Span of Flushing Mechanisms: 20 years.
 - a. Substantiation: Manufacturer's unconditional warranty.
3. Wear Resistance: Provide fixtures, trim and accessories that are resistant to corrosion, breakage, scratching, burning, fading and chipping due to continual contact with water, human usage, and cleaning with abrasive materials.
4. Acid resistant finish at lavatories, sinks and urinals.

F. Operation and Maintenance:

1. Fixture Functions:
 - a. Lavatories: Standard spout, ~~with integral overflow.~~
 - b. Urinals: Siphon jet flushing action.
 - c. Kitchen Sinks: Swivel spout, water spray nozzle.
 - d. Drinking Fountains: With hand operation, foot operation; chilled water service.
 - e. Utility (Mop or Janitor's) Sinks: Filling of standard rolling mop bucket required; spout designed to support full bucket of water.
2. Water Pressure/Flow At Fixtures: 8 psi, minimum, except as otherwise required by code.
 - a. Siphon Jet Action Flush Water Closets: 35 psi, minimum.
 - b. Flush Valves at Water Closets and Urinals: 15 psi for urinals, 35 psi for water closets, minimum.
3. Water Consumption:
 - a. Water Closets: 1.6 gallons per flush, maximum, with complete waste removal in one flush.
 - b. Urinals: 1.0 gallon per flush, maximum, with complete waste removal in one flush.
 - c. Lavatory Faucets in Public Restrooms: 0.5 gallon per minute.
 - d. Lavatory Faucets in Other Areas: 2.2 gallons per minute.
 - e. Drinking Fountains: 0.75 gallons per minute.
 - f. Shower Head: 2.5 gallons per minute.
4. Maintenance Service:
 - a. Electrically-Powered Fixtures: Only battery-power operation is allowed.
5. Ease of Cleaning:
 - a. Use wall-mounted fixtures in public restrooms, for ease of cleaning floors.
 - b. Provide adequate access for cleaning each fixture and the areas around it.
6. Ease of Repair:
 - a. Faucet valves easily removable and replaceable as a single unit.

- b. Each pipe connection to each fixture provided with a stop valve, for easy disconnection from water service.
- c. Provide access to all concealed connections, such as floor and wall cleanouts and slip-joint connections.

PRODUCTS**A. Water Closets:**

- 1. Use one or more of the following:
 - a. Tank type.
 - b. External flush valve type.
 - c. Vitreous china.
 - d. Solid plastic resin seat and cover.
 - e. Wall mounted fixtures.
 - f. Floor mounted fixtures.
- 2. Do not use:
 - a. Stainless steel.

B. Urinals:

- 1. Use one or more of the following:
 - a. Vitreous china.
 - b. Wall mounted fixtures.
- 2. Do not use:
 - a. Enameled cast iron.
 - b. Floor mounted, stall type.

C. Lavatories:

- 1. Use one or more of the following:
 - a. Vitreous china.
 - b. Solid plastic resin.
 - c. Stainless steel.
 - d. Countertop-mounted fixtures.
 - e. Undercounter-mounted fixtures.
 - f. Pedestal-mounted fixtures.
 - g. Wall-hung fixtures.
- 2. Do not use:
 - a. Ceramic, non-vitreous china.
 - b. Enameled cast iron.
 - c. Enameled steel.

D. Kitchen Sinks:

- 1. Use one or more of the following:
 - a. Stainless steel.
 - b. Solid plastic resin.
 - c. Countertop-mounted fixtures.
 - d. Undercounter-mounted fixtures.
 - e. Wall-hung fixtures.
- 2. Do not use:
 - a. Plastic.
 - b. Enameled steel.
 - c. Enameled cast iron.
 - d. Pedestal-mounted fixtures.

- e. Wall-hung fixtures.

E. Showers:

1. Use one or more of the following:
 - a. Fiberglass reinforced acrylic resin receptors.
 - b. Fiberglass reinforced acrylic resin walls.
2. Do not use:
 - a. Precast terrazzo receptors.
 - b. Solid plastic resin receptors.
 - c. Solid plastic resin walls.

F. Faucets and Trim:

1. Use one or more of the following:
 - a. Polished chrome-plated finish.
 - b. Polished brass finish.
2. Do not use:
 - a. Colored coated finishes.

G. Drinking Fountains:

1. Use one or more of the following:
 - a. Electric water coolers.
 - b. Stainless steel finished units.
2. Electrical Water Coolers. Mechanically refrigerated drinking water coolers shall conform to ARI 1010, and Lead Contamination Control Act of 1988, Public Law 100-572, October 31, 1991.
3. Do not use:
 - a. Non-refrigerated drinking water fountains.
 - b. Enameled steel units.

H. Utility (Mop or Janitor's) Sinks:

1. Use one or more of the following:
 - a. Precast terrazzo.
 - b. Floor-mounted fixtures.
2. Do not use:
 - a. Stainless steel.
 - b. Enameled cast iron.
 - c. Wall-hung fixtures.

END OF CHAPTER D22

CHAPTER D23**DOMESTIC WATER****PERFORMANCE****A. Basic Function:**

1. Provide hot, cold and hot water return domestic water to plumbing fixtures as required.
2. Domestic water elements comprise the following:
 - a. Water Distribution: Piping within the building, serving fixtures and equipment.
 - b. Plumbing Equipment: Pumps, tanks, filters, and treatment equipment.
 - c. Utility water supply fittings (hose bibbs, wall hydrants) are specified in Chapter D22.
3. Where domestic water elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.
4. Water supply piping shall not be buried under concrete floors, except where it is economically unfeasible to do otherwise. Hot water delivered to toilet facilities shall not exceed ~~100~~ 120 degrees F and 120 degrees F to showers. Traps subject to drying out shall be fitted with trap primers. Water delivered to emergency eyewash and emergency safety showers shall be tepid in temperature.
5. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D2 - Water and Drainage.

B. Amenity and Comfort:

1. Location:
 - a. Water heaters will be located in utility room and/or mechanical rooms.
 - b. Do not locate water heaters where the public has access to them.
2. Water Conditioning: Provide water supply with conditioning equipment to remove odors and hardness.
3. Noise:
 - a. Design to prevent noise due to water hammer.
 - b. Provide water hammer arrestors as shown on drawings to eliminate noise produced by the domestic water fixtures.

C. Health and Safety:

1. Excess Pressure Hazard: Include devices to reduce accidental excess pressure to acceptable level, with maximum overpressure of 10 percent over specified system operating pressure, for the following items:
 - a. Water heaters.
 - b. Hot water storage tanks.
 - c. Booster pumps.
 - d. Hot water recirculating pumps.
2. Water Contaminants: Provide filtration device on water supply to drinking fountains, breakroom sinks, and kitchen sinks.

D. Durability:

1. Shock Resistance: Do not use cast iron fittings, valve bodies, materials, and components where thermal or mechanical shock is expected.
2. Moisture: Do not locate water heaters where leakage would cause damage to surrounding building materials, above ceilings, under counters, or inside cabinets, unless drip pans piped to floor drains are provided.

3. Condensation: Provide insulation on all domestic water piping fittings, valves and equipment to limit condensation.
 4. Temperature Changes: Provide method of allowing thermal expansion of domestic water in the hot water system and in the cold water system, and in the hot water return system.
 - a. Provide expansion tanks with bladders.
- E. Operation and Maintenance:
1. Pressure Classification: Provide pipe, pipe components, and equipment with a pressure classification of 175 psi.
 2. Energy Efficiency:
 - a. Heat Loss: Provide insulation to limit heat loss of domestic hot water to a maximum of 2 degrees F in any 100 feet of pipe, when water is running, and maximum of 2 degrees F per hour, when water is standing.
 - b. Heat Loss: Provide recirculating pumps to limit the domestic hot water temperature drop to 2 degrees F within 100 feet of fixtures requiring domestic hot water.
 - c. Equipment Heat Loss: Provide insulation on the following equipment to limit domestic hot water heat loss to maximum of 2 deg F per hour, without energy input:
 - 1) Water softeners.
 - 2) Storage tanks.
 - 3) Water heaters.
 - 4) Hot water expansion tanks.
 3. Method of Removing Air:
 - a. Use one of the following:
 - 1) Automatic air vents.
 - 2) Manual air vents.
 - 3) Eliminating air tanks.
 4. Water Heating Method:
 - a. Use one of the following:
 - 1) Electric water heaters.
 - 2) Gas-fired water heaters.
 - 3) Hot water storage tanks.
 - 4) Instantaneous heater.
 5. Ease of Service and Maintenance:
 - a. Fixture Shut-Off: As specified in Chapter D22.
 - b. Equipment Isolation: Valves on both supply and discharge sides.

PRODUCTS

- A. Water Piping, Buried:
1. Use one of the following:
 - a. Copper pipe (ASTM B 42-1998), with brazed or soldered cast copper or wrought copper or bronze fittings, or flared cast bronze fittings.
 - b. Ductile iron water pipe, cement lined, with ductile iron or gray iron fittings and gasketed joints.
 2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - c. Chlorinated polyvinyl chloride (CPVC) plastic pipe.
 - d. Polybutylene (PB) plastic pipe or tubing.
 - e. Polyvinyl chloride (PVC) plastic pipe.
 - f. Polyethylene pipe and fittings, with mechanical clamped joints.
 - g. Polyethylene/aluminum composite pipe, with brass compression joints.

- h. Concrete, clay, or asbestos cement pipe.
- i. Lead pipe or fittings (bends, traps, caps and plugs).

B. Water Piping, Not Buried:

- 1. Use one of the following:
 - a. Copper tube, cast copper, wrought copper, or bronze fittings, and soldered joints.
 - b. Galvanized steel pipe, cast iron fittings, and grooved mechanical couplings (except for hot water).
- 2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - c. Chlorinated polyvinyl chloride (CPVC) plastic pipe or tubing.
 - d. Polyvinyl chloride (PVC) plastic pipe or tubing.
 - e. Polybutylene (PB) plastic pipe or tubing.
 - f. Cross-linked polyethylene (PEX) plastic pipe or tubing.
 - g. Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX/AL/PEX) pipe or tubing.
 - h. Polyethylene/aluminum/polyethylene (PE/AL/PE) pipe or tubing.
 - i. Concrete, clay, or asbestos cement pipe.
 - j. Lead pipe or fittings (bends, traps, caps and plugs).

C. Insulating Materials:

- 1. Use the following:
 - a. Cellular elastomeric
 - b. Armaflex or equivalent
- 2. Do not use:
 - a. Any plastic foam, fiber, or cellular insulation.
 - b. Mineral fiber.
 - c. Cellular glass.
 - d. Calcium silicate.
 - e. Fiberglass.

D. Valves For Shut-Off or Isolation of Equipment, Fixtures, and Parts of Systems:

- 1. Use one of the following:
 - a. Ball valves.
 - b. Gate valves.
 - c. Butterfly valves.
 - d. Globe valves.
 - e. Plug valves.

E. Valves For Flow Control, Throttling, or Bypass:

- 1. Use the following:
 - a. Globe valves.
- 2. Do not use:
 - a. Ball valves.
 - b. Gate valves.
 - c. Butterfly valves.

- d. Plug valves.

END OF CHAPTER D23

CHAPTER D24**SANITARY WASTE****PERFORMANCE****A. Basic Function:**

1. Provide drainage for disposal of waste as required by the code and for the following:
 - a. Fixtures and equipment which have a waste connection or a domestic water connection.
 - 1) Waste connections are not required on icemakers, refrigerators with icemakers, exterior hose bibbs, coffee makers, and emergency eyewash/shower.
 - b. Emergency Drainage: Floor drains located in:
 - 1) Basements.
 - 2) Laundry rooms.
 - 3) Rooms where waterproof membrane is specified or installed under floor finish.
 - 4) Public bathrooms with trap primers.
 - c. Cleaning Drainage: Floor drains located as indicated in program.
 - d. Indirect Drainage: Floor drains to receive piping from:
 - 1) Equipment drain pans.
 - 2) Condensate drains.
 - 3) Other equipment that produces clear wastes.
 - 4) Other equipment specified to have indirect drain.
 - 5) Walk-in coolers.
2. Where sanitary waste and vent elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.
3. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D2 - Water and Drainage.
4. Nearest lift station is located in Building 703: Two 5 hors power pumps capable of delivering 200 GPM @ 40 ft TDH.

B. Amenity and Comfort:

1. Convenience:
 - a. Do not locate floor drains and floor cleanouts in doorways or directly in traffic paths.
2. Odors:
 - a. Do not terminate vents within 10 feet horizontally of doors, windows, air intake or exhaust openings, or other openings in the exterior enclosure, unless vent termination is at least 3 feet above the top of the opening.
 - b. Do not locate vent openings under overhangs.
 - c. Do not locate vent openings closer than 10 feet to lot line.
 - d. Extend vent pipes at least 12 inches above the surface of roofs.
 - 1) Exception: Where roof areas are to be occupied for normal building functions, extend vent pipes at least 7 feet above the roof surface.
 - e. Extend vent pipes at least 12 inches above overflow level of the highest fixture served by the vent.
 - f. Provide an automatic means of priming traps which may evaporate enough water to break the trap seal allowing sewer gases to enter the building, on all floor drains.

C. Health and Safety:

1. Flammable or Toxic Wastes: Provide means of safely disposing of:
 - a. Gasoline.
 - b. Diesel fuel.
 - c. Oil.
 - d. Anti-freeze (glycol solution).

- e. Acetone.
- f. Pesticides

Disease and Infection:

- a. Do not locate indirect drains in toilet rooms, unventilated or inaccessible rooms, or in air distribution or return plenums.
- b. Do not use a backflow prevention device in the sewer discharge to prevent back-up into plumbing fixtures and floor drains.

D. Structure:

- 1. Hub-and-Spigot Joint Support: Support joints so they do not separate under weight of pipe or live loads.

E. Durability:

- 1. Corrosion Resistance:
 - a. Where corrosive wastes can be neutralized or diluted below harmful levels, removal is not required; otherwise, provide appropriate interceptors to remove corrosive wastes, including solids.
 - b. Neutralizing Devices: Automatically operating, using water or neutralizing medium to render basic materials, acidic materials, and other chemical wastes harmless.
 - 1) Construct the drainage system upstream of the neutralizing devices using materials which are resistant to the specific corrosive elements entering the system.
 - 2) Corrosive agents entering the sanitary drainage system which must be neutralized or removed:
 - a) Oil.
 - c. Oil Interceptors: Located as indicated in program.
- 2. Condensation:
 - a. Prevent condensation from forming on or dripping from sanitary drain piping, floor drain bodies, drinking fountain or water cooler waste piping, condensate piping, and p-traps.

F. Operation and Maintenance:

- 1. Maintenance of Drainage:
 - a. Where sewer discharge is higher than item to be drained, provide a means of lifting the waste for drainage.
 - 1) Method of Lifting Waste: Provide a duplex sewage pump and vented sump system to lift waste to the sanitary sewer for drainage.
 - b. Fittings, Joints, and Offsets: As required to ensure optimal flow through horizontal and vertical piping and at changes of direction.
 - c. Transitions Between Horizontal Piping and Vertical Risers:
 - 1) Sanitary Waste: Sanitary tees, wyes, or wyes and eighth bends.
 - 2) Vents: Wyes, wyes and eighth bends, and short radius fittings.
- 2. Ease of Cleaning:
 - a. Floor Drains: At low points in floor and flush with finish floor surface.
 - b. Cleanout Plugs: Flush with floor surface.
 - c. Drain equipment which produces or collects clear waste, such as condensation from cooling coils. Provide piping for the clear waste to the nearest floor drain.
 - d. Indirect Waste Pipes Over 1 inch Diameter: Provide a means to catch and remove solid materials 1/2 inch and larger, such as a strainer.
 - e. Oil Interceptors: Located as shown on drawings.
- 3. Ease of Maintenance:
 - a. Interceptors That Must be Manually Cleaned:
 - 1) Designed for minimum of 2 months operation between cleanings.
 - 2) Located close to or in the same area as drains that receive the harmful wastes, for

supervision and maintenance by occupants creating the waste.

- 3) Removable waste container, with spare.
- 4) Substantiation:
 - a) Design Development: Manufacturer's maintenance schedule and recommended methods.

PRODUCTS

A. Sanitary Waste and Vent Piping, Buried: (15105)

1. Use one or more of the following:
 - a. Extra heavy cast iron pipe and fittings, hub-and-spigot, with lead/oakum joint ***seals or rubber compression joints for hub and spigot pipes in lieu of lead/oakum seals.***
 - b. Reinforced concrete pipe and fittings, with gasketed joints.
2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - c. Asbestos-cement sewer pipe.
 - d. Polyvinyl chloride (PVC) pipe.
 - e. Non-reinforced concrete pipe.
 - f. Fiberglass pipe.
 - g. Vitrified clay pipe.
 - h. Lead pipe.

B. Sanitary Waste and Vent Piping, Not Buried: (15105)

1. Use one or more of the following:
 - a. Service weight cast iron pipe and fittings, hubless, with neoprene gaskets and stainless steel clamps.
 - b. Copper tubing (DWV), with cast bronze or wrought copper fittings and soldered joints.
2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic piping and fittings.
 - c. Brass pipe.
 - d. Polyvinyl chloride (PVC) pipe.
 - e. Galvanized steel pipe.
 - f. Aluminum (DWV) pipe.
 - g. Fiberglass pipe and fittings.
 - h. Lead pipe.
 - i. Glass pipe.

C. Chemical Resistant Sanitary Waste and Vent Piping: (15105)

1. Use one or more of the following:
 - a. High silicon iron alloy pipe with bell and spigot fitting using acid-resistive packing and lead joints.
 - b. Polypropylene pipe and fittings, with fusion welded joints.
2. Do not use:
 - a. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - b. Polyvinyl chloride (PVC) DWV pipe.
 - c. Glass pipe and fittings, with gasketed compression couplings.
 - d. Copper pipe, copper tubing, galvanized steel pipe, or lead pipe.
 - e. Vitrified clay pipe.
 - f. Glass pipe and fittings.

D. Cleanout Plugs: (15120)

1. Use one or more of the following:
 - a. Brass.
 - b. Stainless steel.
2. Do not use:
 - a. Plastic.

E. Cleanout Caps:

1. Use one of the following:
 - a. Brass.
 - b. Cast iron.
2. Do not use:
 - a. Plastic.
 - b. Reinforced neoprene.

F. Floor Drains:

1. Use one of the following:
 - a. Cast iron.
 - b. Copper.
2. Do not use:
 - a. Lead.
 - b. Plastic.

END OF CHAPTER D24

CHAPTER D25

RAIN WATER DRAINAGE

PERFORMANCE

A. Basic Function:

1. Provide and install drainage for disposal of rain water and clear wastes, as required by the code.
 - a. Drainage of roofs must be accomplished without the use of roof drains.
 - b. Drainage of roof areas that do not drain naturally without ponding, including built-in gutters.
 - c. Clear wastes include condensate drainage and HVAC cooling water.
 - d. Drainage for outdoor areas that are completely surrounded by construction that prevents natural drainage (e.g. areaways) or that are so sloped as to result in accumulation of water or ponding.
 - e. Drainage of interior areas where ground water may accumulate naturally, including sump pits and elevator pits.
2. Where rain water drainage elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.
3. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D2 - Water and Drainage.

B. Amenity and Comfort:

1. Condensation:
 - a. Insulate horizontal and vertical rain water piping, including the underbody of roof drains, using material of sufficient insulating value to prevent condensation.
2. Convenience:
 - a. Install floor drains flush with the surface on which they are installed, out of pedestrian traffic patterns wherever possible.
3. Odors:
 - a. Provide traps for all indoor drains connected to rain water drainage system.
 - b. If rain water drainage system connects to sanitary sewer system, provide a trap at the connection.
4. Appearance:
 - a. Do not locate rain water leaders ~~or downspouts~~ where they are visible from the outside of the building. **Exterior downspouts are acceptable. Downspouts shall connect and discharge to underground storm water system, as outlined in Section 01010, Part II, Paragraph 4.a.4).**

C. Health and Safety:

1. Vermin Resistance: Provide grated coverings for drains to prevent entry of rodents, insects, birds, and miscellaneous foliage.

D. Structure:

1. Locate drains to avoid ponding loads in excess of structural capacity.
2. Prevent inadvertent ponding by protecting drain openings from clogging, using raised strainers with minimum height of 4 inches wherever possible and flat gratings in all other locations.

E. Durability:

1. Water Penetration: Reinforce weather barrier around drains using extremely durable, permanently watertight material; one acceptable method is using 4 pound sheet lead, extending

minimum of 12 inches from center of drain.

2. Abuse: Protect drainage conductors and leaders by placing in dedicated locations.

F. Operation and Maintenance:

1. Maintenance of Drainage: Pipes sloped at 1/8 inch per foot, minimum, downward in direction of flow.
2. Drainage Outlets: As specified in Chapter D and as follows:
 - a. Primary rain water drainage system shall discharge underground and connect to exterior underground rain water drainage system.
 - b. Secondary Drainage: Drain to completely redundant drain piping system.
 - c. Scuppers: Drain to rain water drainage system.
 - d. Parking and Service Garages: Drain floor drains into rain water drains, not into sanitary sewer.
 - e. Areaways and Courtyards: Drain to rain water drainage system.
 - f. No rain water shall spill on grade, except secondary drainage system.
3. Capacity:
 - a. Roof Areas of 10,000 sq ft and Less: Minimum of two roof drains.
 - b. Roof Areas of 10,000 sq ft or More: Minimum of four roof drains.
 - c. Areaways and Courtyards: Drainage is not required for areas with less than 300 square feet open to the sky.

PRODUCTS

A. Rain Water Piping, Not Buried:

1. Use one or more of the following:
 - a. Service weight cast iron pipe and fittings, hubless, with neoprene gaskets and stainless steel clamps.
2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - c. Brass pipe.
 - d. Polyvinyl chloride (PVC) pipe.
 - e. Copper pipe.
 - f. Copper tube.
 - g. Galvanized steel pipe.
 - h. Aluminum pipe.
 - i. Fiberglass pipe.
 - j. Lead pipe.

B. Rain Water Piping, Buried:

1. Use one or more of the following:
 - a. Extra heavy cast iron pipe and fittings, hub and spigot, with lead/oakum joint seals.
 - b. Reinforced concrete drain pipe and fittings, with gasketed joints.
2. Do not use:
 - a. Plastic pipe of any type.
 - b. Acrylonitrile butadiene styrene (ABS) plastic pipe.
 - c. Polyvinyl chloride (PVC) pipe.
 - d. Copper pipe.
 - e. Copper tube.
 - f. Fiberglass pipe.
 - g. Vitrified clay pipe.

C. Roof Drains, Area Drains, and Floor Drains: (15120)

1. Use one or more of the following:
 - a. Bronze.
 - b. Galvanized cast iron.
2. Do not use:
 - a. Plastic.
 - b. Stainless steel.

END OF CHAPTER D25

CHAPTER D3**HVAC - HEATING, VENTILATING, AND AIR CONDITIONING****PERFORMANCE****A. Basic Function:**

1. Provide artificial means of controlling temperature, relative humidity, velocity, and direction of air motion in the interior spaces enclosed by the shell, and will reduce airborne odors, particulates, and contaminant gases.
2. The HVAC system consists of the following elements:
 - a. Energy Supply (D31): Elements which provide energy used to maintain building comfort.
 - b. Heat Generation (D32): Elements required to heat building to maintain space comfort.
 - c. Refrigeration (D33): Elements necessary to generate the cooling required to maintain building comfort.
 - d. Air Distribution (D34): Elements required to distribute air to maintain building comfort.
 - e. Hydronic and Steam Distribution (D35): Elements required to distribute chilled water, heating water, and water to maintain building comfort.
 - f. HVAC Controls (D36): Elements required to control equipment which maintains building comfort.
3. HVAC systems shall be in accordance with the Unified Facilities Guide specifications.
4. Where HVAC elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
 - a. In addition to the requirements of this chapter, comply with all applicable requirements of Unified Facilities Guide Specification, UFC 3-410-01, 02, 03, and Chapter D3 - HVAC.

5. HVAC warranty to be a 5-year extended warranty for components. Do not include labor.**B. Amenity and Comfort:**

1. Outside design conditions for Dover AFB:
 - a. Summer: 89 deg F DB and 75 deg F WB at 7.5 MPH wind.
 - b. Winter: 14 deg F at 19 MPH wind.
2. Design space temperatures/humidity:
 - a. Computer Rooms: year-round 70 deg F - 74 deg F, 50% RH
 - b. Administration and Office Areas: summer 70 deg F - 74 deg F; winter 70 deg F - 75 deg F
 - c. Cargo Processing Areas: winter 65 deg F - 70 deg F
 - d. Special Handling Storage Areas: winter 65 deg F - 70 deg F

C. Health and Safety:

1. Electrical Shock Prevention:
 - a. Provide a means of disconnecting power at each piece of equipment.
2. Smoke Control: Coordinate control of ventilation fans, supply fans, return fans, exhaust fans, and dampers with smoke control system.
3. Refrigerants:
 - a. Comply with the requirements of ASHRAE 15-2001.
 - b. Prevent release of refrigerant to atmosphere.
 - c. Prevent exposure of occupants to hazardous refrigerants.
 - 1) Substantiation:
 - a) Construction: Measurement of refrigerant concentration in mechanical equipment rooms where refrigerants are located.
4. Indoor Air Quality: Provide sufficient ventilation to obtain acceptable indoor quality, determined

using the Ventilation Rate Procedure of ANSI/ASHRAE 62-2001. Provide carbon monoxide sensing systems in all areas which have fuel burning equipment.

- a. Substantiation:
 - 1) Design Development: Engineering analysis.
 - 2) Occupancy: Field testing and survey of occupants.
 - 3) **Mold Prevention: Provide substantiation in accordance with requirements from Air Force ETL 43-02 on mold prevention..**

5. Air Pressurization: Ensure that all personnel areas are maintained at a positive pressure.

D. Operation and Maintenance:

1. HVAC Design Criteria:
 - a. Entering chilled water temperature: 55 deg. F.
 - b. Leaving chilled water temperature: 45 deg. F.
 - c. Entering heating hot water supply: 160 deg. F.
 - d. Leaving heating hot water return: 180 deg. F.
2. HVAC Equipment Reliability:
 - a. Chillers: Provide multiple compressors with multiple refrigerant circuits.
 - b. Boilers: Hot water (dual fuel).
 - c. Air-cooled Condensers: Provide matching refrigerant circuits to chillers.
 - d. Chiller Pumps: Provide one redundant pump.
 - e. Heating Hot Water Supply Pumps: Provide one redundant pump.
 - f. Air Handlers: Multiple belt sheaves.
 - g. Substantiation:
 - 1) Preliminary Design: Identification of design strategies to minimize HVAC disturbances.
 - 2) Design Documents: Identification of equipment that requires redundancy.
 - 3) Construction: Functional performance testing.
 - 4) Occupancy:
 - a) If equipment is damaged or malfunctions within one year after completion, reporting of the cause of equipment damage or malfunctions.
 - b) Corrective Action; Provide corrective measures necessary to eliminate equipment damage and malfunctions.
 - c) Corrective Action Report: Identification of corrective measures implemented to protect HVAC equipment. Verify that HVAC equipment is operating properly and without damage.
3. Ease of Maintenance: Provide minimum clearances for equipment for removal and maintenance.

PRODUCTS

A. HVAC System Type (all systems shall be Trane or **York, or Carrier**):

1. Use one or more of the following. **A single central heating and cooling plant serving both the main AFT building and the Outsized Cargo/DCS/FTF/CDF or more than one heating and cooling plants are acceptable:**
 - a. Chillers:
 - 1) Air-cooled split chilled water unit.
 - 2) Air-cooled packaged chilled water unit.
 - 3) Geothermal cooling.
 - 4) **Chilled water AHUs with air-cooled package chillers outside on grade**
 - b. Central HVAC Systems:
 - 1) Chilled water and hot water heating systems with fan coil units, unit ventilators and air handlers.
 - 2) Variable volume air handlers with chilled water and hot water heating with air terminals.

- 3) Unit heaters.
 - 4) H&V unit ventilators.
 - 5) ***Radiant Heat to include below slab hot water system***
 - 6) ***Split type DX air handlers***
- c. Stand-Alone HVAC Systems (isolated areas):
- 1) Air-cooled self-contained air handlers with hot water heat.
 - 2) ***Gas fired air handlers may be used in the DCS/FTF/CDF in lieu of providing hot water boiler or in lieu of running underground water piping from the main Air Freight Terminal building boiler plant.***

END OF CHAPTER D3

- 2) Make-up air units (with heating and cooling).

END OF CHAPTER D3

CHAPTER D31

ENERGY SUPPLY

PERFORMANCE

A. Basic Function:

1. Provide dual fuel natural gas and No. 2 diesel fuel oil for use by HVAC equipment in accordance with code and as follows. ***The same No. 2 diesel fuel oil tank(s) that serve as back-up for the boiler(s) shall also serve the emergency generator(s). Tank(s) shall be sized based on the emergency generator requirements found in Chapter 51. The location(s) of the fuel tank(s) shall be in accordance with NFPA 30 and the UFC4-010-01, DoD Minimum Antiterrorism Standards for Buildings.***
2. Comply with ICC International Fuel Gas Code-2003.
3. Comply with ICC International Mechanical Code-2003.
4. Substantiation:
 - a. Preliminary Design: Identification of each piece of equipment requiring fuel.
 - b. Design Development: Distribution system and equipment connections shown on drawings.
 - c. Construction: Functional performance testing; proper fuel supply, combustion, and venting.
5. Where energy supply elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
6. In addition to the requirements of this chapter, the construction will comply with all applicable requirements of Unified Facilities Guide Specifications and Chapter D3 - HVAC.

B. Amenity and Comfort:

1. Heating: Provide fuel to all fuel burning equipment that is used to maintain space comfort.
2. Leakage:
 - a. Provide leak-free distribution systems.
 - b. Provide containment of No. 2 diesel fuel oil as required by 40 CFR 280.
 - c. Provide double-wall containment of No. 2 diesel fuel oil distribution system and comply with requirements of 40 CFR 280.
 - d. Monitoring and Leak Detection:
 - 1) Provide tank monitoring as required by 40 CFR 280, by the following methods:
 - a) Inventory control.
 - b) Manual tank gauging.
 - c) Tank tightness testing.
 - d) Automatic tank gauging.
 - e) Vapor monitoring.
 - f) Ground-water monitoring.
 - g) Interstitial monitoring.
 - 2) Provide pipe monitoring as required by 40 CFR, by the following methods:
 - a) Automatic line leak detectors.
 - b) Line tightness testing.

C. Health and Safety:

1. System Design Pressure: 125 psig, minimum.
2. Natural Gas System Working Pressure: 1 psig, maximum.
3. Diesel Fuel System Working Pressure: 5 psig, maximum.
4. Natural Gas Entrance into Facility: The construction will locate the service meter at least 10-feet

from ignition sources outside of the premises.

END OF CHAPTER D31

D. Structural:**1. Seismic Protection:**

- a. Provide fuel distribution system with the ability to flex where differential movement is anticipated, clearances around piping at walls and floors to allow movement, and valves to stop flow in case of rupture due to a seismic event.
- b. Provide fuel distribution system supports capable of supporting twice its installed weight.

E. Durability:

1. Expected Service Life Span: Provide a system which will last a minimum of 20 years in service without major repairs or operating expense.
2. Vandalism: The construction will protect the service meter from unauthorized access.
3. Accidental Damage: Protect service meter from accidental damage by installing bollards to stop vehicles.
4. Provide locked gated wire cage.

F. Operation and Maintenance:

1. System Capacity: The construction will provide a fuel supply line (pipe) with capacity to serve the facility plus 50 percent reserve capacity.
2. Ease of Use:
 - a. The construction will locate fuel piping system mains in mechanical room.
3. Ease of Service:
 - a. The construction will provide shut-off valves as required by code and at each branch connection.

PRODUCTS**A. Pipe:**

1. Use one or more of the following:
 - a. Materials permitted by code.
 - b. Stainless steel pipe with threaded or welded joints.
 - c. Steel pipe with threaded or welded joints.
2. Do not use:
 - a. Copper pipe.
 - b. Aluminum-alloy pipe.
 - c. Ductile iron pipe.
 - d. Plastic pipe.

B. Fittings:

1. Use one or more of the following:
 - a. Materials permitted by code.
 - b. Stainless steel.
 - c. Steel.
2. Do not use:
 - a. Copper.
 - b. Aluminum-alloy.
 - c. Ductile iron.
 - d. Plastic.

AIR FREIGHT TERMINAL, DOVER AFB

PROJECT NUMBER: FJX043003
REQUEST FOR PROPOSAL
SOLICITATION NO: DACA61-03-R-0009
AMENDMENT NO. 0015

END OF CHAPTER D31

CHAPTER D33**REFRIGERATION****PERFORMANCE****A. Basic Function:**

1. Provide the necessary equipment to generate the cooling required to maintain building comfort.
2. Refrigeration elements comprise water chillers, condensing units, packaged terminal air-conditioners, auxiliary equipment, and air-cooled condensers.
3. Where refrigeration elements also must function as elements defined within another element group, meet the requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter D3 - Heating, Ventilating, and Air Conditioning (HVAC), and Unified Facilities Guide Specifications.

B. Health and Safety:

1. Provide condensing units that comply with ASHRAE 15-2001, Safety Code for Mechanical Refrigeration.
2. Construct chiller pressure vessels to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels, 2001, including both coolers and condensers.

C. Durability:

1. Temperature Endurance: Provide equipment designed for temperatures ranging from 0 degrees F to 122 degrees F.

D. Operation and Maintenance:

1. Design Criteria:
 - a. Tonnage: Provide necessary tonnage upon completion of load calculations.
 - b. Chilled Water Flow: Approximately 2.4 gpm per ton.
 - c. Evaporator Pressure Drop: Maximum 20 feet of water.
 - d. Evaporator Fouling Factor: 0.00025 sq ft deg F hr/Btu.
 - e. Condenser Fouling Factor: 0.00025 sq ft deg F hr/Btu.
 - f. Substantiation:
 - 1) Preliminary Design: Estimated cooling loads and design criteria.
 - 2) Design Development: Design calculations and sample manufacturer data showing capacity available.
 - 3) Construction: Manufacturer's data showing performance, certified by independent testing agency.
2. Energy Efficiency:
 - a. Chillers:
 - 1) Energy Efficiency Ratio (EER): 14, calculated as specified in ARI 550/590-1998(&AllAd.).
 - 2) Integrated Part Load Value (IPLV): 12, calculated as specified in ARI 550/590-1998(&AllAd.).
 - b. Condensing Unit Integrated Part Load Value (IPLV): 12, calculated as specified in ARI 365-1994.
 - c. Condensing Unit Energy Efficiency Ratio (EER): 14, minimum, at standard rating conditions specified in ARI 365-1994.
 - d. Substantiation:
 - 1) Design Development: Manufacturer data showing efficiency available.
 - 2) Construction: Manufacturer's data showing performance, certified by independent

- testing agency.
- e. Packaged Terminal Air-Conditioners- Heat Pumps:
 - 1) PTAC Heating Coefficient of Performance (COP): 5, minimum, calculated as specified by ARI 310/380-1993.
 - 2) PTAC Cooling Energy Efficiency Ratio: 14, minimum, at standard rating conditions specified by ARI 310/380-1993.
 - 3. Hazards:
 - a. Condensers and Condensing Units: Provide safe access to all parts that must be serviced, including railings at edges of platforms and stairs.
 - b. Where maintenance personnel could be exposed to chemicals during routine maintenance and repair, furnish all personal safety equipment and clothing necessary for adequate protection.

PRODUCTS

- A. Refrigeration Units (all units shall be Trane, or York, or Carrier):
 - 1. Use one or more of the following:
 - a. Air-cooled rotary screw chiller with split outdoor air-cooled condenser.
 - b. Packaged air-cooled rotary screw chiller.
 - c. **Do not use water cooled condensers.**
- B. Auxiliary Equipment:
 - 1. Use the following:
 - a. Chemical feed pumps and tanks.
 - b. Chilled water strainers/filters.
 - c. Control panel.
 - d. Test connections.
 - 2. Glycol:
 - a. Provide food grade propylene glycol in the heating hot water system and chilled water system down to +10 deg. F.

END OF CHAPTER D33

CHAPTER D34**AIR DISTRIBUTION****PERFORMANCE****A. Basic Function:**

1. Distribute air to maintain the required space conditions.
 - a. Special-Purpose Exhaust: See Chapter D3 HVAC.
2. Where air distribution elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
3. In addition to the requirements of this chapter, the construction will comply with all applicable requirements of Unified Facilities Guide Specifications and Chapter D3 - HVAC.
4. Do not use humidifiers in administrative areas ***except for the Computer Operations Section.***

B. Amenity and Comfort:

1. Space Temperature Control: Coordination of air distribution system's design and installation with zoning and space temperature requirements specified in specified in Chapter D36 - HVAC Controls.
2. Air Movement:
 - a. Provide an air distribution system that limits the air velocity to 100 fpm, maximum at work stations.
 - b. Adjustments: Provide an air distribution system which allows relocating supply diffusers, adjusting dampers, and changing the thermostat setpoint.
 - c. Substantiation:
 - 1) Occupancy: Measure air movement at work station in accordance with ANSI/ASHRAE Standard 55-1992 with Addendum in areas where more than 10 percent of the occupants are uncomfortable and adjust air distribution system to make occupants comfortable.
3. Acoustical Performance:
 - a. Air Distribution Background Noise: Provide systems which comply with the acoustical requirements.
 - b. Air Distribution Background Noise: Provide systems which comply with the acoustical requirements - Interiors and the following NC Levels as defined in ASHRAE HVAC Applications Handbook, 1999. Do not exceed the sound pressure level for any octave band at the specified noise criteria (NC).
 - 1) Halls, Corridors, and Lobbies: 35-45, neutral.
 - 2) Executive and Private Offices: 25-35, neutral.
 - 3) Conference Rooms: 25-35, neutral.
 - 4) Open Plan Offices: 30-40, neutral.
 - 5) Classrooms: 40, maximum, neutral.
 - 6) Substantiation:
 - a) Design Development: Equipment product data that predicts sound levels for anticipated use.
 - b) Construction: Measurement, record, and report of sound pressure levels in each octave frequency band.
 - (1) Measurement of room sound levels at the center point of the room area.
 - (2) Measurement of room sound levels with ANSI S1.4-1983(R01), Type 1 sound level meters.
 - (3) Measurement of room sound levels with NC sound level.
 - (4) Submittal of procedure for meter calibration.
 - (5) Calibration of meters and then measure room sound levels.

- (6) Result Interpretation:
 - (a) Acceptable NC Levels: Measured sound pressure levels are below the specified dB levels for the given octave band.
 - (b) Remedial Action: Reduction of sound pressure levels which exceed specified dB levels for a given octave band.
 - 7) Computer Room: 35-45, neutral
 - 8) Board Room: 25-35, neutral
 - 9) Lecture Hall: 25-35, neutral
 - 10) Break Room: 35-45, neutral
 - c. Provide equipment with sound ratings which comply with testing and rating requirements of ARI 880-1998.
 - 1) Substantiation:
 - a) Design Development: Equipment acoustical performance data.
 - b) Construction: Tested and rated air terminals.
 - 4. Cleanliness: Provide filtration of the air distributed to the occupied spaces.
 - a. Filter Efficiency: 85 percent arrestance per ASHRAE Standard 52.1-1992.
 - b. Filter Efficiency: 30 percent atmospheric dust-spot efficiency per ASHRAE Standard 52.1-1992.
 - 5. Odor: Provide exhaust to remove odors.
 - a. Toilet Room Exhaust: 75 cfm per water closet or urinal
 - b. Janitors Closet Exhaust: 2 cfm per sq. ft..
 - c. Locker Room Exhaust: 10 air changes per hour.
 - d. Ventilation Exhaust: 4 air changes per hour.
 - 6. Appearance:
 - a. Diffuser Shape: Provide square, round, rectangular, or linear diffusers with dampers.
 - b. Diffuser Face: Provide louvered face diffusers, or perforated plate with dampers.
 - c. Linear Diffusers: Provide two slot linear diffusers with dampers.
 - d. Diffuser Color: Provide diffusers with ceiling matching color or which are off-white.
 - e. Registers: Provide double-deflection blades with dampers.
- C. Health and Safety:
- 1. Bacterial Growth: Do not use humidification equipment due to excessive maintenance and may also cause mold.
 - 2. Electrical Shock Prevention:
 - a. Provide a disconnect switch at each powered induction unit and electric reheat coil and air handling unit.
 - 3. Fire Sources: Provide air distribution elements constructed from incombustible materials.
 - 4. Fire Spread: Provide interlocks to prevent operation or start-up of air distribution elements when fire or smoke detection systems are in alarm condition.
 - 5. Accidental Explosion: Provide ventilation to prevent build-up of explosive gases as follows:
 - a. Uninterruptible Power Supply Room: 10 air changes per hour.
 - b. ~~Special cargo processing area: 10 air changes per hour. See Appendix I~~
 - 6. Safety:
 - a. Provide ladders, catwalks and platforms conforming to OSHA Standards to permit access to high-mounted equipment.
 - b. access doors of sufficient size to allow for movement in and out of the equipment room.
 - c. clearance around equipment to permit servicing and repair.

D. Durability:

1. Expected Service Life Span: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
2. Aesthetic Life Span: Provide units exposed within the occupied space which will not fade, chip, or peel for a minimum of 20 years.
 - a. The manufacturer shall provide a 5-year extended warranty for all components and labor.
3. Exposed Units within Occupied Spaces: Heavy gage, galvanized sheet steel, painted casing.
4. Accidental Damage: Protection of ductwork, air handlers, fans, and condensing units from accidental damage.

E. Operation and Maintenance:

1. Capacity:
 - a. Humidifier: 100 pounds of steam per hour).
2. Operating Parameters:
 - a. Propeller Fans: Do not use propeller fans at static pressure above 1 inch water gage.
 - b. Duct Construction: In accordance with SMACNA HVAC Duct Construction Standards 1995 and NFPA 90A with Addendum No. 1, based on the following:
 - 1) Supply Duct Pressure Class: 2 inches w.g..
 - 2) Return Duct Pressure Class: 2 inches w.g..
 - 3) Outside Air Duct Pressure Class: 2 inches w.g..
 - 4) Exhaust Duct Pressure Class: 2 inches w.g..
 - 5) Transfer Duct Pressure Class: 2 inches w.g..
 - 6) All Ducts Pressure Class: 2 inches w.g..
 - 7) Duct Pressure Class: 2 inches w.g. for ducts between the supply fan and the terminal boxes. All other duct applications 2 inches w.g.
 - 8) Duct Seal Class C for Duct Pressure Class 2 inches w.g.
 - c. Air Velocity: 2000 feet per minute, maximum.
 - d. Maximum Air Velocity:
 - 1) For 2 Inches W.G. Duct Pressure Class: 2000 feet per minute.
 - e. Fans: Match fan pressure characteristics to the air distribution system pressure characteristics including the system effect factors; pressure characteristics based on ANSI/AMCA Standard 210-1999 fan ratings and system characteristics based on engineering calculations.
 - 1) Substantiation:
 - a) Preliminary Design: Identification of the type of fan to be used.
 - b) Design: Calculations showing the air distribution pressure characteristics and data supporting the selection of the fan.
 - c) Construction: Calculations showing the air distribution systems pressure characteristics; AMCA seal and ratings on each fan used.
3. Ease of Use: Provide units with individual controls coordinated with controls specified in Chapter D36.
4. Ease of Cleaning: Provide units with removable access panels to allow cleaning.
5. Ease of Maintenance: Provide HVAC equipment which allows access to and removal of all components.
6. Peak Electrical Demand: Provide a random start relay to prevent simultaneous start-up of all the heat pumps. Coordinate control requirements with Chapter D36 - Controls and Instrumentation.

7. Energy Efficiency:
 - a. Unitary Air-Conditioner Integrated Part Load Value (IPLV):.75, minimum, calculated as specified by ARI 210/240-1994 or ARI 340/360-2000.
 - b. Unitary Air-Conditioner Seasonal Energy Efficiency Ratio (SEER):, minimum, at standard rating conditions specified by ARI 210/240-1994 or ARI 340/360-2000.
 - c. Substantiation:
 - 1) Preliminary Design: EER for proposed equipment.
 - 2) Design Development: Manufacturers published EER for equipment selected for this project.
 - 3) Construction: Equipment with manufacturers name listing EER, type or style, model or serial number, and catalog number.

PRODUCTS

A. Humidifiers:

1. Use the following:
 - a. Electric humidifiers.
2. Do not use:
 - a. Gas-fired humidifiers.
 - b. Ultrasonic fog generation humidifiers.
 - c. Pan humidifiers.
 - d. Jacketed steam humidifiers.

B. Ductwork:

1. Use one or more of the following:
 - a. Galvanized sheet metal duct.
 - b. Steel sheet metal duct.
 - c. Stainless steel sheet metal duct.
 - d. Flexible ducts shall be maximum 4-feet in length.
 - e. Rectangular.
 - f. Round.
 - g. Oval.
2. Do not use:
 - a. Aluminum sheet metal duct.
 - b. Fibrous glass duct.
 - c. Ductboard.

C. Diffusers, Registers, and Grilles:

1. Use the following:
 - a. Steel diffusers.
2. Do not use:
 - a. Aluminum diffusers.
 - b. Stainless steel diffusers.

D. Louvers:

1. Louvers shall be fabricated from galvanized steel.
2. 18 gauge galvanized 1/2-inch mesh screen in removable frame.
3. Louver blades shall be folded or beaded for rigidity and baffled to exclude driving rain.
4. Do not use:
 - a. Steel fan housing with an aluminum propeller.
 - b. Aluminum fan housing with an aluminum propeller.

- c. Steel fan housing with an aluminum centrifugal wheel.

E. Air Filters:

1. Use one or more of the following:
 - a. Pleated panel filters (30% efficiency, tested in accordance with ASHRAE 52.1)
 - b. Cartridge filters (80 to 85% efficiency, tested in accordance with ASHRAE 52.1).
 - c. Supply spare filters equipment.
2. Do not use:
 - a. Panel filters.
 - b. Automatic roll filters.
 - c. Extended surface filters.
 - d. Bag-type filters.
 - e. Cleanable media filters.

F. Acoustical Attenuator Systems:

1. Use one or more of the following:
 - a. Acoustical duct lining.
 - b. Preformed duct lining.
 - c. factory fabricated sound attenuator ducts.
 - d. Sound attenuators (traps).

G. Ductwork Accessories:

1. Access doors for air flow measuring, automatic dampers, fire dampers, coils, thermostats and other apparatus requiring service and inspection in the duct systems.
2. Fire damper shall conform to the requirements of NFPA 90A and UL555.
3. Manual balancing dampers shall conform to SMACNA HVAC Duct Construction Standards, latest edition.

H. Plenums and Casings (Insulated Sheet Metal Panels):

1. Plenums and casings shall be fabricated and erected as shown in SMACNA HVAC Duct Construction Standards, latest edition.

I. Insulation:

1. Provide thermal insulation as follows:
 - a. Air plenum and all ductwork in equipment rooms rigid board with reinforced aluminum foil (FRK) facing. Joints are sealed with UL181 pressure sensitive tape.
 - b. Supply and return ducts above ceilings with foil-faced ductwrap with vapor barrier ASTM C553.
 - c. Air plenums, ductwork in equipment rooms, all ductwork below and above ceiling the insulation shall be 2-inches thick.
 - d. Relief air ducts above and below ceilings with foil-faced ductwrap with vapor barrier ASTM C553.
 - e. Exhaust air ducts above and below ceilings with foil-faced ductwrap with vapor barrier ASTM C553.
2. Insulation shall be furnished on equipment below 60 deg. F, including the following:
 - a. Pumps.
 - b. Cold water storage tank.
 - c. Water softeners.
 - d. Cold and chilled water pumps.
 - e. Roof drain bodies.
 - f. Expansion and air separation tanks.

3. Insulation for hot equipment surface (75 deg. F to 400 deg F.):
 - a. Converters.
 - b. Heat exchangers.
 - c. Hot water generators.
 - d. Water heaters.
 - e. Pumps.
 - f. Air separation tanks.
- J. Ductwork Support Systems:
 1. Ductwork supports shall be according to SMACNA HVAC Construction Standards, Metal and Flexible, NFPA shall comply with latest edition.
 2. Seismic ductwork supports shall be in accordance with SMACNA Guidelines for Seismic Restraints to Mechanical System, First Edition 1991.
- K. Dampers:
 1. Use the following:
 - a. Shafts on balancing dampers must pass through both sides of the duct.
 2. Do not use:
 - a. Splitter damper for balancing.
- L. Submittals:
 1. Shop Drawings: Drawings showing equipment layout, electrical connection diagrams, ductwork layout showing location of supports and hangers.
 2. Components and Equipment: Manufacturer's catalog data included with the detail drawings for each item.
 3. Air Balancing Report: Provide air balance report in accordance with NEBB or AABC Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
 4. Operation and Maintenance Manuals: Provide six manuals listing step-by-stop procedures required for system startup, operation, shutdown, and routine maintenance.
- M. Air System Equipment:
 1. Fan shall be tested and rated in accordance with AMCA 210. Fans may be connected to the motors either directly or indirectly.
 - a. Use one or more of the following:
 - 1) Steel fan housing with a stamped steel propeller.
 - 2) Aluminum fan housing with an aluminum centrifugal wheel.
 - 3) Steel fan housing with a steel centrifugal wheel.
 2. Centrifugal fans shall be fully enclosed, single-width, single-inlet, or double-width, double-inlet, AMCA pressure class I, II or III, as required for design conditions.
 3. In-line fans shall have centrifugal backward-inclined blades, stationary discharge conversion vanes, internal and external belt guards, and adjustable motor mounts.
 4. Axial flow fans shall be complete with drive components and belt guard, and shall have a steel housing, cast fan wheel, cast or welded steel diffusers, fan shaft and airfoil blades.
 5. Fan shall be propeller type, assembled on a reinforced metal panel with venturi opening spun into panel.
 6. Centrifugal type power wall ventilators - fan shall be direct or V-belt driven centrifugal type with backward-inclined wheel.
 7. Centrifugal type power roof ventilator - fan shall be direct or V-belt driven with backward-inclined

wheel.

8. Propeller type power roof ventilators - fan shall be direct or V-belt driven. Fan housing shall be hinged or movable weathertight, with framed base constructed of aluminum or galvanized steel.
9. Suspended cabinet type ceiling fans shall be centrifugal type, with acoustically insulated housing.

END OF CHAPTER D34

CHAPTER D35**HYDRONIC DISTRIBUTION****PERFORMANCE****A. Basic Function:**

1. Distribute heating water and cooling water to maintain the required space conditions.
2. System(s) required include high temperature water system and chilled water system.
3. Configuration - Heating Water: Direct return.
4. Configuration - Chilled Water: Direct return.
5. Where hydronic distribution elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
6. In addition to the requirements of this chapter, the construction will comply with all applicable requirements of Unified Facilities Guide Specifications and Chapter D3 - HVAC.

B. Amenity and Comfort:

1. Space Temperature Control: Coordination of HVAC distribution system's design and installation with zoning and space temperature requirements specified in Chapter D36 - Controls and Instrumentation.

C. Health and Safety:

1. Accidental Explosion: Provide pressure relief valves to prevent overpressurizing the systems.
2. Fire Source: Provide distribution elements constructed from incombustible materials.

D. Durability:

1. Expected Service Life Span: Provide a heating water, chilled water, and condensate system which will last a minimum of 20 years in service without major repairs or operating expense.
 - a. The manufacturer shall provide a 5-year extended warranty for all components and labor.
2. Pressure Ratings: Provide air coils with pressure ratings of 300 psig and which exceed the pressure rating of the system in which they are installed.
3. Erosion Control: Provide a means of removing air, sand, and other solids from cooling water, and heating water distribution systems to prevent erosion. Design systems in a manner to prevent cavitation.
4. Corrosion Control: Drain condensate from cooling coils to prevent corrosion of associated equipment.
5. Underground Piping Corrosion Control: Wrap buried piping in a sealed bituminous jacket. Provide a cathodic protection system to protect buried piping.
6. Pipe Stress and Strain Control: Provide pipe loops, bends, expansion joints, and flexible pipe connectors to reduce stress and strain due to expansion and contraction.

E. Operation and Maintenance:

1. Operating Parameters:
 - a. Heating Water:
 - 1) System Pressure: 125 psig.
 - 2) Distribution Temperature: 180 deg F.
 - b. Building Systems:
 - 1) Heating Water System Pressure: 30 psig, maximum.

- 2) Chilled Water System Pressure: 125 psig, maximum.
- 3) Water Velocity: 8 feet per second, maximum.
- c. Pumps: Match pump pressure and flow characteristics with the pressure and flow characteristics of the distribution system.
 - 1) Substantiation:
 - a) Preliminary Design: Identification of the type of pump to be used.
 - b) Design Development: Calculations showing the hydronic distribution water flow and pressure requirements and pump data supporting pump selection.
 - c) Construction: Calculations showing the hydronic system pressure requirements; manufacturer's pump curve for each pump used.
2. Ease of Maintenance: Provide valves at branch take-offs for each zone.
3. Glycol:
 - a. Provide food grade propylene glycol in the heating hot water system and chilled water system down to +10 deg. F.

PRODUCTS

A. Chilled Water Distribution Piping:

1. Pipes 2-1/2 inches in diameter and smaller:
 - a. Hard copper, Type L with brazed or silver soldered wrought copper fittings.
2. Pipes larger than 3 inches in diameter:
 - a. Schedule 40, electric resistance welded pipe.
 - 1) Joints and Fittings:
 - a) Flanged Class 150 wrought steel fittings.

B. Heating Water Distribution Piping:

1. Pipes 2 inches in diameter and smaller:
 - a. Schedule 40, continuous welded steel pipe with threaded Class 150 psi wrought steel fittings.
2. Pipes ~~larger than~~ 2-1/2 inches in diameter and ~~smalle lagerr~~.
 - a. Schedule 40, electric resistance welded pipe.
 - 1) Joints and Fittings:
 - a) Flanged Class 150 psi wrought steel fittings
3. Valves with rising stems, ASME B16.34.

C. Oil Piping:

1. Pipes 2 inches in diameter and smaller:
 - a. Schedule 80, seamless carbon steel with threaded made to ASTM A-53. Fittings schedule 80 steel.

D. Gas Piping:

1. Pipes 2 inches in diameter and smaller:
 - a. Schedule 40 seamless carbon steel with threaded made to ASTM A-53. Fittings cast iron.
2. Pipes larger than 2 inches in diameter:
 - a. Schedule 40, seamless carbon steel electric resistance welded pipe. Fittings schedule 40 carbon steel.

E. Auxiliary Equipment:

1. Use the following:
 - a. Chemical feed pumps and tanks.
 - b. Water strainers/filters.

- c. Control panel.
- d. Test connections.

F. Welding:

- 1. Use on one or more of the following:
 - a. For welding heating piping, use ASME B31.1, ASME B31.2 or AWS Z49.1.

G. Submittals:

- 1. Shop Drawings: Drawings showing piping layouts connected to all equipment showing all supports, hangers, valves and piping specialties.
- 2. Water Balancing Report: Provide a water balance report in accordance with NEBB or AABC Procedural Standards for testing, adjusting and balancing of hydronic systems.

END OF CHAPTER D35

CHAPTER D36

HVAC CONTROLS

PERFORMANCE

A. Basic Function:

1. Provide the elements necessary to control and monitor the building's indoor environment.
 - a. Provide a thermostat for each zone to maintain the required space conditions and control for each major piece of HVAC equipment.
 - b. Provide a building automation system (BAS) using direct digital control **to** monitor and control HVAC system. All controls and components shall be Trane Tracer DDC system as provided by TRANE SUMMIT.
 - c. Carbon dioxide monitoring system in auditorium.
 - d. Carbon monoxide detection system in areas with gas operating vehicular.
 - e. In addition to requirements of this Chapter, the construction will comply with all applicable requirements of Unified Facilities Guide Specifications and Chapter D3 - HVAC - Heating, Ventilating and Air Conditioning, and Chapter D32 - Heat Generation.
 - 1) Provide a temperature sensor for each zone to maintain the required space conditions.
 - 2) Provide monitoring and control of major pieces of HVAC equipment.
 - 3) **Monitoring shall include but not be limited to** the following equipment:
 - a) Air terminals.
 - b) Air handlers:
 - (1) On-off status.
 - (2) Entering air temperature.
 - (3) Leaving air temperature.
 - (4) Entering chilled water temperature.
 - (5) Leaving chilled water temperature.
 - (6) Entering heating water temperature.
 - (7) Leaving heating water temperature.
 - (8) Supply fan **airflow damper position**.
 - (9) Return fan **airflow damper position**.
 - (10) Exhaust fan **airflow damper position**.
 - (11) Outside **airflow damper position**.
 - (12) Filter static pressure.
 - c) Chillers:
 - (1) On-off status.
 - (2) Entering chilled water temperature.
 - (3) Leaving chilled water temperature.
 - (4) Percent of full load.
 - (5) Chilled water flow.
 - (6) Safety controls.
 - d) Boiler Hot Water:
 - (1) On-off status.
 - (2) Entering water temperature.
 - (3) Leaving water temperature.
 - (4) Percent of full load.
 - (5) Safety controls.
 - (6) **System hot water flow**
 - e) Packaged terminal air-conditioning units.
 - f) Fan coil units.
 - g) Unit ventilators.
 - h) Pumps:
 - (1) On-off status.

- (2) Variable speed drives.
- (3) Constant speed drives.
- 4) Controlling **shall include but not be limited to** the following equipment:
 - a) Air terminals.
 - b) Air handlers:
 - (1) Start-stop.
 - (2) Entering air temperature.
 - (3) Leaving air temperature.
 - (4) Entering chilled water temperature.
 - (5) Leaving chilled water temperature.
 - (6) Entering heating water temperature.
 - (7) Leaving heating water temperature.
 - (8) Supply fan **airflow damper position**.
 - (9) Return fan **airflow damper position**.
 - (10) Exhaust fan **airflow damper position**.
 - (11) Outside **airflow damper position**.
 - (12) Filter static pressure.
 - c) Chillers:
 - (1) Start-stop.
 - (2) Entering chilled water temperature.
 - (3) Leaving chilled water temperature.
 - (4) Entering condenser water temperature.
 - (5) Leaving condenser water temperature.
 - (6) Percent of full load.
 - (7) Chilled water flow.
 - (8) Condenser water flow.
 - (9) Safety controls.
 - d) Boilers:
 - (1) Start-stop.
 - (2) Entering water temperature.
 - (3) Leaving water temperature.
 - (4) Percent of full load.
 - (5) Safety controls.
 - (6) **System hot water flow**.
 - e) Packaged terminal air-conditioning units.
 - f) Fan coil units.
 - g) Unit ventilators.
 - h) Pumps:
 - (1) Start-stop.
 - (2) Variable speed drives.
 - (3) Constant speed drives.

B. Amenity and Comfort:

- 1. Zoning and Space Temperature Control:
 - a. Dedicated terminal unit and thermostat for each separated space. **A “separated space” is any space separated from other spaces by walls except for individual offices adjacent to each other with the same outside wall exposure. Such offices can share VAV boxes. Open office areas outside those individual offices shall have separate VAV boxes.**
 - b. Dedicated terminal unit and thermostat for each corner space.
 - c. Single thermostat and terminal unit for spaces with similar function, exposure, and location.
 - 1) Interior spaces will be zoned together, separate from exterior spaces.
 - 2) **Exterior** spaces will be zoned together, separate from interior spaces.
 - d. Maximum Interior Zone Size - Cooling Mode: 1500 square feet.
 - e. Maximum Interior Zone Size - Heating Mode: 1500 square feet.

- f. Maximum Exterior Zone Size - Cooling Mode: 1500 square feet.
 - g. Maximum Exterior Zone Size - Heating: 1500 square feet.
 - h. Zone each conference room, training room, meeting room, board room, lobby, and common area, separately. Dedicate at least one terminal unit and thermostat to each zone.
 - i. Provide each computer room with a dedicated zone. Provide humidity and temperature control.
 - j. Substantiation:
 - 1) Preliminary Design: Plans indicating occupancy types with special HVAC requirements shown.
 - 2) Design Development: Documents showing zoning, air handlers, air terminals, equipment locations, equipment sizes, and air distribution. Equipment cut sheets.
 - 3) Construction: Testing, adjusting, and balancing report indicating initial airflow, final airflow, initial temperature, final temperature, initial relative humidity, and final relative humidity of each conditioned space. Measurement of parameters when space is occupied, during summer when the outside air temperature is within 10 percent of the summer design conditions, and during the winter when the outside air temperature is within 10 percent of the winter design conditions.
 - 4) Construction: Report conforming to the requirements of AABC or NEBB Test & Balance Procedures.
- 2. Building Control System: Provide a central location to monitor and control each zone setpoint.
 - 3. Humidity Control: Provide monitoring and control of humidification equipment in areas specified on drawings.
- C. Health and Safety:
- 1. Life Safety: Provide interconnection and coordination of HVAC controls with other life safety systems. Provide smoke evacuation system per NFPA and IBC.
 - 2. Fire Sources: Provide products which are rated for the specific locations where they are installed.
- D. Durability:
- 1. Expected Service Life Span: Provide a system which will last a minimum of 20 years in service without major repairs or operating expense.
 - a. Substantiation:
 - 1) Design Development: Identification of a system manufactured by Trane.
 - 2) The manufacturer shall provide a 5-year extended warranty for components and labor.
 - 2. Vandalism: Protect the system field panels and central controller from unauthorized access and the public.
 - 3. Accidental Damage: Protect thermostats, temperature sensors, control wiring, field panels, and computer, keyboard, and monitor from accidental damage.
- E. Operation and Maintenance:
- 1. System Capacity: Provide a building control system with sensors and points to perform as specified and add 20 percent more points.
 - 2. Ease of Use:
 - a. Locate field panels in electrical closets.
 - b. Locate the central controller in base monitoring station.
 - c. Provide a system which is user programmable, has a graphic user interface, has dial-in modem access from remote locations, and has multiple layers of secured access to data and program information.
 - d. Provide field panels which are independent and do not need the central controller to

- continue functioning.
- e. Provide a communication line via telephone between the existing central controller in Building 615 (HVAC Shop) and the new Building Automation System (BAS).
- 3. Ease of Service:
- 4. Allowance for Change and Expansion: Provide a building control system which is expandable to meet future needs.
 - a. Spare Capacity: Provide sensors and points required to perform as specified and add 20 points more than required.
 - b. Spare Capacity: Provide a central controller with field panel slots to perform as specified and add 20 percent more slots in the central controller.
- 5. Energy Efficiency: Provide the following control functions or features:
 - a. Holiday scheduling.
 - b. Night setback.
 - c. Outside air economizer.
 - d. Waterside economizer.
 - e. Chiller staging.
 - f. Optimum start.
 - g. Optimum stop.
 - h. Chilled water temperature reset.
 - i. Heating water temperature reset.
 - j. Variable speed pumping.
 - k. Demand limiting and load shedding.
- F. Training:
 - 1. Training required for DDC:
 - a. Minimum 8 hours classroom training (may occur off-site within 90 miles of DAFB) for a minimum of 10 people. Minimum 4-hour building specific on-site of commissioned HVAC system for minimum of 10 people.

PRODUCTS

- A. Building Control System Types:
 - 1. Use the following:
 - a. Direct digital control (DDC) system.
- B. Operators and Sensors:
 - 1. Use one or more of the following:
 - a. Electric valve actuators.
 - b. Electric damper actuators.
 - c. Electric thermostats.
 - d. Thermocouples.
 - e. Thermistors.

END OF CHAPTER D36

CHAPTER D39

OTHER HVAC ELEMENTS

PERFORMANCE

A. Basic Function:

1. Provide equipment to maintain space conditions as indicated in the project program and as follows:
 - a. Energy recovery units at 70 degrees F.
 - b. Dehumidifiers at 74 degrees F, 50% RH.
2. Where other HVAC elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
3. In addition to the requirements of this chapter, the construction will comply with all applicable requirements of Unified Facilities Guide Specifications and Chapter D3 - HVAC.

B. Amenity and Comfort:

1. Temperature Control: Coordination of temperature control with HVAC controls.
2. Humidity Control:
 - a. Provide dehumidification equipment in areas of high humidity.
3. Cleanliness: Provide filtration of the air entering the energy recovery unit and dehumidifier.
 - a. Filter Efficiency: 85 percent arrestance per ASHRAE Standard 52.1-1992.
 - b. Filter Efficiency: 25 percent atmospheric dust-spot efficiency per ASHRAE Standard 52.1-1992.

C. Health and Safety:

1. Electrical Shock Prevention:
 - a. Provide dehumidifiers that are tested and listed by UL.

D. Operation and Maintenance:

1. Energy Recovery Unit Performance:
 - a. Sensible Heat Recovery: 95 percent, minimum.
 - b. Latent Heat Recovery: 95 percent, minimum.
2. Dehumidifier Capacity: 15 pints of moisture per day; rated in accordance with ANSI/AHAM DH-1-2002.

PRODUCTS

A. Dehumidifiers:

1. Use one or more of the following:
 - a. Desiccant type dehumidifiers.
 - b. Refrigeration cycle type dehumidifiers.

B. Energy Recovery Units:

1. Use one or more of the following:
 - a. Enthalpy wheels.
 - b. Heat pipes.
 - c. Air-to-air units.

C. Emergency Intake and Exhaust Systems

END OF CHAPTER D39

CHAPTER D41

FIRE SPRINKLER AND EXTINGUISHING SYSTEMS

PERFORMANCE

A. Basic Function:

1. Provide a fire sprinkler system or systems for all interior spaces, and for future expansion in Marshall and yard area future addition.
2. Provide wet pipe sprinkler, dry pipe sprinkler, ~~preaction~~, double interlock sprinkler, unless otherwise indicated or required by code.
3. Provide code-required coverage for the entire facility.
4. Fire Sprinklers: Design and construction in accordance with code and NFPA 13-2002.
5. Standpipes and Hoses: Design and construction in accordance with code and NFPA 14-2000.
6. Where fire sprinkler and extinguishing elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
7. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D4 - Fire Protection, UFC-3-600-1 and Unified Facilities Guide Specifications UFGS.
8. ***Provide in-rack sprinklers in accordance with UFC-3-66-01.***

B. Amenity and Comfort:

1. Accessibility:
 - a. Provide fire department connection within 150 feet of fire department vehicle access.
 - b. Provide a hose cabinet at intervals of 100 feet as required by code.
2. Appearance:
 - a. All spaces with suspended ceiling unless indicated otherwise noted: Concealed sprinklers.
 - b. Provide hose cabinets with finish ***to match interior finishes*** and solid metal door panel, glass window in the door, and space for a manual, dry-chemical fire extinguisher.
 - c. Provide valves with brass finish.
 - d. Provide fire department connections with brass finish.
3. Convenience: Provide fire department connections with brass finish.

C. Health and Safety:

1. Sprinkler Head Performance: As required by code and NFPA 13-2002.
2. Water Demand Requirements:
 - a. Determine minimum water supply requirements for each sprinkler system using the hydraulic calculation method defined by NFPA 13-2002.
 - b. Substantiation:
 - 1) Preliminary Design: Identification of water source.
 - 2) Design Development: Provide two separate water supply sources from two separate mains.
 - 3) Construction: Tests of each sprinkler system in accordance with the requirements of the design standard.
3. Water Source:
 - a. Provide fire pump designed in accordance with NFPA 20-1999.
 - b. Provide water from a public service main. Typical for two separate water supplies with two backflow preventers.

D. Structural:**1. Seismic Design:**

- a. Provide a sprinkler system which allows movement where differential movement is anticipated, with clearances around piping at walls and floors, and with valves to stop flow in case of rupture due to a seismic event.
- b. Provide sprinkler system supports capable of supporting three times its installed wet weight.

E. Durability:

1. Expected Service Life Span: Provide a sprinkler system which will be viable for the life of building when maintained as specified in NFPA 25-2002.
 - a. Substantiation:
 - 1) Preliminary Design: Identification of the system type to be installed.
 - 2) Design Development: Identification of a similar system in use in an existing facility for 3 years and consisting of components from the same manufacturers.

F. Operation and Maintenance:

1. Provide sprinkler system and fire pump maintenance in accordance with NFPA 25-2002.
2. Provide sprinkler system maintenance in accordance with NFPA 25, 2002.
3. Ease of Service:
 - a. Spare Sprinkler Heads: Provide additional sprinkler heads as required by code to service the system.

PRODUCTS**A. Pipe:**

1. Use one or more of the following:
 - a. Wet pipe - Schedule 40 black steel.
 - b. Dry pipe - Schedule 40 galvanized steel.
 - c. Dry pipe - Schedule 10 galvanized for pipes 2-1/2" and larger.
 - d. Fittings for galvanized piping shall be galvanized.
 - e. Piping for sprinkler drainage system shall be galvanized steel.
2. Do not use:
 - a. Copper pipe.
 - b. CPVC pipe.
 - c. PB pipe.

B. Fittings:

1. Use the following:
 - a. Materials permitted by code.
 - b. Steel.
 - c. Cast iron.
2. Do not use:
 - a. Copper.
 - b. CPVC.
 - c. PB.

END OF CHAPTER D41

CHAPTER D43**FIRE DETECTION AND ALARM****PERFORMANCE****A. Basic Function:**

1. Provide automatic fire detection and alarm systems as required by code, Unified Facilities Criteria UFC 3-600-01, and Unified Facilities Guide Specifications UFGS.
2. In addition to protected premises system(s), provide connection between protected premises and supervising station by radio.
3. Connect the protected premises system(s) to the base fire department via transmission to on-premises supervising station located on the base.
4. Integrated systems performing all functions are preferred, subject to requirements of code for separated, independent systems.
5. Where fire detection and alarm elements also must function as elements defined within another element group, meet the requirements of both element groups.
6. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D4 - Fire Protection.
7. Substantiation:
 - a. Preliminary Design: Outline description of systems, inter-system interfaces, and functions provided.
 - b. Design Development: Details of each type of input and output device; capacities of systems; manufacturer data.
 - c. Construction Documents: Detailed layout of input and output device locations.
 - d. Closeout: Complete functional performance testing as specified in UFC-3-600-01, 2003.

B. Amenity and Comfort:

1. Accessibility: Comply with requirements of local, State, and federal authorities for facilities for the disabled.
2. Color: All fire alarm components, except manual pull stations shall be white in color.

C. Health and Safety:

1. Detection, Alarm, Notification Methods: In accordance with NFPA 72-2002, NFPA 90, ADA UFC 3-600-01, UFC 4-021-01 and Unified Facilities Guide Specifications UFGS.
2. System Performance and Integrity: Initiating device circuits shall be Class A, style D. Notification appliance circuits shall be Class A, style Z.
3. Evacuation Plan: Multiple smoke zones and alarm notification of any zone or combination of zones in addition to general evacuation of entire premises.
4. Detection:
 - a. Air Handling Units Over 2,000 cfm: Minimum of one detector in both supply and return.
 - 1) Duct detectors shall be powered and controlled from the FACP to permit remote test.
 - 2) Duct detectors shall be dual contact type.
 - 3) Duct detectors shall shutdown associated AHU by contacts located in the duct detectors.
 - b. Upon detection of fire or smoke condition, automatic notification of occupants, building operations staff, and owner's central emergency staff.
5. Alarms:

- a. Means for occupants to communicate same types of alarm as automatic system does.
 - b. Manual stations at minimum of 200 feet intervals along means of egress paths.
 - c. Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.
 - d. Visual alarms, in locations required by code.
 - e. ~~Separate audible and visual signals for alarms and trouble notification in corridors.~~
6. Fire Protection Controls:
- a. Provide connections between alarm and detection system and fire suppression system activation sensors.
 - b. Upon Alarm: Shut down or deactivate the following:
 - 1) HVAC air distribution.
 - 2) Elevators (fire emergency service).
 - 3) Fire-rated door hold-opens.
 - 4) Locks restricting exit through doors constituting means of egress.
7. Audible and visual supervisory trouble notification of operations staff, for alarm zone failures, annunciator zone failures, ground faults, backup power failure, water supply equipment failures.
8. Error and Failure Prevention: "Tamper" sensors at sensitive points; products of only one manufacturer or certified by manufacturer as compatible.
9. Substantiation:
- a. Construction or Closeout: Functional performance tests.
- D. Operation and Maintenance:
1. Power Supplies:
 - a. Dedicated Battery Backup Power: For:
 - 1) Fire safety systems, 48 hours minimum.
 - 2) Emergency communications, 48 hours minimum.
 2. Owner Personnel Training:
 - a. Operational: Minimum of 8 hours, for 2 persons, for each separate system.
 - b. Maintenance: Minimum of 8 hours, for 2 persons, for each separate system.
- E. The fire alarm system shall be divided into **zones**. The following **lettered paragraphs indicate the minimum required** ~~zones as a minimum~~ **in the designated (numbered paragraphs) building/building block. The code mandated area limitation of each zone shall also be observed.**
1. Terminal Building:
 - a. Import area landside
 - b. Import area flight line
 - c. Export area landside
 - d. Export area flight line
 - e. Refrigerated storage
 - f. Recoop shop
 - g. Support spaces: mechanical, electrical and fire pump rooms
 - h. Special handling - offices and support spaces
 - i. Special handling - multiple special storage and security bays
 - j. Freight transfer flight
 - k. Ramp services
 - l. Vehicle dispatch area
 - m. Mechanized material handling shop - shop area
 - n. Mechanized material handling shop - support spaces
 2. North Administrative Block:
 - a. Squadron command staff

- b. Mobility/training flight
 - c. Combat flight readiness
 - d. Computer operations
 - e. Squadron auditorium
 - f. Air freight flight
 - g. Cargo movement section (TMO) and customer service, service liaisons
 - h. Locker room and amenities and general circulation first floor
 - i. Amenities and general circulation - 2nd floor
 - j. 46th aerial port squadron
3. Landside Administrative Block:
- a. Air freight flight
 - b. customer service
 - c. cargo movement
 - d. support spaces
4. Flightline Administrative Block:
- a. Air terminal operations
 - b. Squadron operations
 - c. Amenities and general circulation - 1st floor
 - d. Amenities and general circulation - 2nd floor

PRODUCTS

A. Control Systems for All Applications:

- 1. Use the following:
 - a. Monaco Enterprises Inc., Monaco M-2 non-addressable fire alarm control ~~panel or approved equivalent.~~
 - b. Monaco Enterprises Inc. transceiver and lightning arrestor ~~or approved equivalent.~~
 - c. The assigned radio frequency for the transceiver is 138.925 MHZ.

B. Fire/Smoke Detectors:

- 1. Use the following:
 - a. Photoelectric smoke detectors.
 - b. Thermal detectors.
 - c. Rate compensated detectors.

C. Warning Devices:

- 1. Use the following:
 - a. Horns.
 - b. Speakers.
 - c. ADA Strobes.
 - d. Combination speaker /strobes.
 - e. Combination horn/strobes.

D. Circuit Color Coding:

- 1. Wire Color - Circuit Purpose:
 - a. Red(+)/black(-) - Signaling circuits
 - b. Purple/white - Pull stations
 - c. Blue/orange - Lower heat detectors.
 - d. Brown/yellow - Upper and attic heat detectors.
 - e. Brown/blue - Water flow switches.
 - f. Orange/yellow - Tamper switch
 - g. Black/red - Smoke detector power

- h. White/yellow - Smoke detector loop.

END OF CHAPTER D43

CHAPTER D5**ELECTRICAL POWER****PERFORMANCE****A. Basic Function:**

1. Provide electrical power with the appropriate characteristics to operate all electrically operated devices, including those in other services.
2. The electrical system comprises the following elements:
 - a. Electrical Energy Generation (D51): Utility power sources, engine-generator systems, battery power systems, and uninterruptible power supply systems.
 - b. Service and Distribution (D52): Service entrance equipment, distribution equipment, transformers, motor control equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
 - c. Branch Circuits (D53): Branch circuit wiring and receptacles and other branch circuit wiring systems.
3. Utility Revenue Meters: Meter incoming electrical service on the secondary side of the service transformer.
4. Where electrical power elements also must function as elements defined within another element group, meet the requirements of both element groups.
5. In addition to the requirements of this chapter, comply with Unified Facilities Guide Specifications, all applicable requirements of Part III - Facility Performance and Chapter D - Services, and UFC 3-520-01.
6. Substantiation:
 - a. Construction: Continuity test of wiring systems prior to functional performance test.
Functional performance test of wiring systems, generator, UPS and security system.
7. ***Suggested Tie-In Point to Existing Electrical Distribution System: Nearest electrical utility pole on Atlantic Street. Primary voltage is 12470/7200 volt grounded wye.***

B. Amenity and Comfort:

1. Convenience:
 - a. Locate metering in a single location for each building.
 - b. Provide means of reading power meters, demand meters, and kilovoltampere demand meters. Power and demand meters shall have communication capability for future connection by Owner for remote reading.
 - c. Provide an interface between the electrical monitoring and the building automation system including the following:
 - 1) Switchboard Monitoring:
 - a) Power Analysis Values:
 - (1) Output voltage of each phase; line-to-line and line-to-neutral.
 - (2) Output current; each phase and ground.
 - (3) Real power; per phase.
 - (4) Reactive power; per phase.
 - (5) Apparent power; per phase.
 - (6) Power factor; per phase.
 - (7) Frequency.
 - 2) Energy Readings of:
 - a) Real accumulated energy.
 - b) Reactive accumulated energy.

- c) Apparent accumulated energy.

C. Health and Safety:

1. Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.
 - a. Protect against access to spaces housing electrical components and allow access only by qualified personnel.
 - b. Provide electrical distribution equipment with locking cabinets, doors, and panels when it is located in public areas.
 - c. Hazardous Locations: Comply with code.
2. Emergency and Standby Systems: Provide emergency and standby power when normal power is interrupted, for the following. ***It is acceptable to use one generator or both emergency and stand-by power.***
 - a. Systems and areas as required by code shall have emergency power.
 - b. All other systems and areas shall have standby power.
3. Hazardous Locations: Comply with requirements of NFPA 70-2002 chapter on Hazardous (Classified) Locations.

D. Durability:

1. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250-1997 and:
 - a. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
 - b. Exterior, Exposed to Weather and Wind: Type 3S.
 - c. Exterior, Other Locations: Type 3R.
 - d. Interior, Subject to Settling Dust, Falling Dirt, or Dripping Liquids: Type 5.
 - e. Interior, Subject to Circulating Dust: NEMA Type 12.
 - f. Interior, Other Locations: Type 1.

E. Operation and Maintenance:

1. Capacity: Calculated in accordance with NFPA 70-2002.
2. Power Consumption and Efficiency:
 - a. Comply with requirements of IEEE Standard 739-1995.
 - b. Comply with requirements of ASHRAE 90.1-2001.
 - c. Metering: Provide meters to measure power consumption of each structure.
3. Load Characteristics:
 - a. Transient Suppression: Limit voltage transients below damage curve of the electrical system and connected equipment.
4. Protection Against Disturbances:
 - a. Provide circuits which serve sensitive electronic equipment and computer equipment with electrical characteristics within the ranges defined in IEEE Standard 1100-1999.
 - b. Noise Protection: Limit frequency excursions between 90 to 110 percent of design frequency.
 - c. Surge Protection: Voltage excursion limit of 2 times design voltage.
 - 1) Provide protection of the following:
 - a) Receptacles serving personal computer terminals.
 - b) Receptacles serving network servers.
 - c) Power supply to fire alarm panel.
 - d) Power supply to telephone system.
 - e) Entire building service.
 - 2) Substantiation:
 - a) Preliminary Design: Identification of circuits that require surge protection.
 - b) Design Development: Description of surge protection devices to be used.

5. General Receptacle System Voltage: 120 volts/1-phase/60 Hz.
6. Ease of Use:
 - a. Configuration: Design wiring and protective devices so that outages caused by local overloads do not affect unrelated areas or systems.
 - b. Branch-Circuit Panelboards:
 - 1) Provide a dedicated panelboard for lighting which is separate from panelboards serving equipment, sensitive electronic equipment, and each functional area.
 - c. Motor Control: Provide motors with the appropriate protective, control, and indicating devices.
 - d. Monitoring: Provide monitoring of the following:
 - 1) Switchboard Monitoring:
 - a) Power Analysis Values:
 - (1) Output voltage of each phase; phase-to-phase and phase-to-neutral.
 - (2) Output current; each phase and ground.
 - (3) Real power; per phase.
 - (4) Reactive power; per phase.
 - (5) Apparent power; per phase.
 - (6) Power factor; per phase.
 - (7) Frequency.
 - b) Energy Readings of:
 - (1) Real accumulated energy.
 - (2) Reactive accumulated energy.
 - (3) Apparent accumulated energy.
 - 2) Motor Control Center Monitoring:
 - a) Power Analysis Values:
 - (1) Output voltage of each phase; line-to-line and line-to-neutral.
 - (2) Output current; each phase and ground.
 - (3) Real power; per phase.
 - (4) Reactive power; per phase.
 - (5) Apparent power; per phase.
 - (6) Power factor; per phase.
 - (7) Frequency.
 - e. Voltage Regulation: Within 5 percent of design voltage at all branch receptacles.
7. Allowance for Change and Expansion:
 - a. Spare Capacity - System Wide:
 - 1) Load: 25 percent, minimum.
 - 2) Number of Additional Circuits: 25 percent, minimum.
8. Operating Expense: Minimize operating expenses by providing power factor correction.
9. Selective Coordination: The power system shall coordinate with the base power system such that overload and electric fault within a building shall not effect the base electric grid or other buildings. The system shall be designed and circuit protective devices selected to allow maximum selective coordination among circuit protective devices within the system. Provide selective coordination study and submit report.
10. Short Circuit Study: Provide a short circuit study and submit report.
11. Identification: Label all equipment, feeder and boxes. Circuit designations shall include all pole numbers.

END OF CHAPTER D5

CHAPTER D51

ELECTRICAL ENERGY GENERATION

PERFORMANCE

A. Basic Function:

1. Provide electrical energy generation for emergency and standby power systems. ***A single generator or multiple generators are acceptable. Emergency power is defined in the National Electrical Code (NEC) Article 700.1. Standby power is defined in the NEC Article 702.2..***
 - a. Provide emergency power as required by code including the following:
 - 1) Emergency; Exit Lights, Signs and Egress Lighting: Duration for duration of outage.
 - 2) Warning Lights: Duration for duration of outage.
 - 3) Elevators: See Chapter D11 for requirements.
 - 4) Electric Fire Pumps: Duration for duration of outage.
 - 5) Fire Detection and Alarm System: Duration for duration of outage.
 - 6) Public Address System: Duration for duration of outage
 - b. Provide standby power for all loads that are not required by code to have emergency power.
 - c. Provide uninterruptible power supply (UPS) system as follows:
 - 1) Telephone System: Transfer time of 0 seconds.
 - a) Duration of 1.5 hours.
 - 2) Computer Systems and Auxiliary Equipment: Transfer time of 0 seconds.
 - a) Duration of 15 minutes.
2. The two generators for the existing air freight terminal (AFT) shall be salvaged and turned over to the DRMO. Building 510 fire department generator will be salvaged by DAFB. Building 582 generator and Building 585 generator shall be salvaged and turned over to the DRMO.
3. Electrical Energy Generation Capacity.
 - a. Provide capacity at least 40 percent more than the ***connected demand*** load.
 - b. Generator fuel tank capacity shall be minimum 72 hours at full rating of the generator.[<>].
4. Configuration:
 - a. Underground service entrance.
5. Where electrical energy generation elements must also function as elements defined within another element group, meet the requirements of both groups.
6. In addition to the requirements of this chapter, comply with Unified Facilities Guide Specifications and all applicable requirements of Part III - Facility Performance, Chapter D - Services, Chapter D5 - Electrical, and the UFC-4-010-01 for generators located outdoors.

B. Amenity and Comfort:

1. Sound and Noise:
 - a. Provide generator exhaust silencer ratings of the critical (25-35 dB(A)) type.
 - b. Provide generator enclosures of the sound attenuated type.
 - c. Provide uninterruptible power supply systems noise generation of no more than 69 dBA measured at 5 feet.
2. Appearance: Provide emergency lights which appear to be normal space luminaires.
 - a. Exception: Main electrical rooms and generator enclosure shall have self-contained battery backed-up emergency lights in addition to generator back-up lights.

C. Health and Safety:

1. Protection from Breakage: Locate electrical energy generation equipment away from high traffic

areas, building occupants, public, and vehicular traffic.

2. Fire Source: Locate electrical energy generation equipment away from storage area; flammable materials, with the exception of the fuel source for the generator.
3. Accidental Explosion: Ventilate electrical energy generation equipment to prevent the build-up of explosive gases.
4. Electrical Shock: Protect personnel from exposure to live power leads and stray voltage.
5. Intrusion: Protect electrical energy generation equipment from unauthorized access and vandalism.
6. Generators and Fuel Supplies: Located out-of-doors.

D. Structural:

1. Seismic Design:
 - a. Provide an electrical energy generation elements with flexible joints where differential movement is anticipated.
 - b. Provide electrical energy generation equipment supports capable of supporting the seismic force anticipated with the geographic location, as well as mass and center of mass of the equipment.

E. Durability:

1. Moisture Resistance: Provide electrical energy generation equipment which is weatherproof.
2. Corrosion Resistance: Provide electrical energy generation equipment which is weatherproof.
3. Impact Resistance: Provide electrical energy generation equipment with a protective housing and bollards to protect against vehicular collisions.
4. Generator Set Start Up: Start-up within 10 seconds of loss of power.

F. Operation and Maintenance:

1. Uninterruptible Power Supply (UPS) Configuration: Non-redundant with automatic transfer from UPS power to normal power.
 - a. Maintenance Bypass: Provide an external maintenance switch to transfer UPS loads to the standby generators.
 - b. UPS Capacity: 15 kVA.
 - c. Substantiation:
 - 1) Proposal: Listing of input/output voltage, types of load covered, and generic equipment characteristics.
 - 2) Design Development: Single-line drawings, power supply equipment sizes and types, equipment room sizes.
 - 3) Construction Documents: Riser diagrams, calculations, equipment operating parameters.
2. Uninterruptible Power Supply Systems:
 - a. Current Distortion: Less than 10 percent total harmonic distortion with included filter.
 - b. Overload Rating, Percent of Full Load For Any Combination of Linear and Non-Linear Loads:
 - 1) 125 percent for 10 minutes.
 - 2) 150 percent for 30 seconds.
 - c. Harmonic Content of Output Waveform:
 - 1) Maximum 3 percent RMS for single harmonic.
 - 2) Maximum 5 percent RMS for any linear load.
 - 3) Maximum 7 percent RMS for up to 50 percent nonlinear load.
 - d. Functions:

- 1) Internal maintenance bypass.
- 2) Emergency power off.
- 3) Input isolation transformer.
- 4) Maintenance bypass cabinet
- 5) Maintenance bypass transformer (as needed).
- 6) SNMP communications capability.
- 7) Remote monitor panel.
- 8) Alarm status contacts.

PRODUCTS

A. Generator Sets:

1. Engine Type:
 - a. Use the following:
 - 1) Four-stroke with an air to fuel ratio of greater than 16 to 1.
2. Starting and Control Batteries for Generator:
 - a. Use one of the following:
 - 1) Gell-cell or gelled electrolyte type batteries.
3. Products:
 - a. Use the following:
 - 1) Emergency generator by Onan/Cummins ~~or approved equivalent.~~

B. Storage Batteries or Uninterruptible Power Supply Systems:

1. Use the following:
 - a. Valve-regulated lead-calcium.

END OF CHAPTER D51

CHAPTER D53**BRANCH CIRCUITS****PERFORMANCE****A. Basic Function:**

1. Power: Provide adequate electrical power and safe and efficient distribution from panelboards to lighting, wiring devices, equipment, and appliances, based on the project program, other requirements in Volumes A through G, and as follows:
2. Branch circuits comprise the following elements:
 - a. Branch circuit breakers.
 - b. Conductors and cable from panelboards to fixtures, wiring devices, and mechanical equipment.
 - c. Raceways and boxes.
 - d. Wiring devices, including, but not limited to, receptacles, floor boxes and plates, wall switches, wall dimmers, remote control switching devices, and wall plates.
3. Where branch circuits are integral with elements defined within another element group, meet requirements of both element groups.
4. In addition to the requirements of this chapter, comply with Unified facilities Guide Specifications and all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter D5 - Electrical Power.

B. Amenity and Comfort:

1. Accessibility: Comply with ADA Accessibility Guidelines.
2. Convenience:
 - a. Provide convenience receptacles at intervals no greater than 10 feet along the base of all wall areas **except where modified by Appendix I**. Each wall shall have minimum one receptacle.
3. Computer:
 - a. Provide double-duplex receptacles for each computer, workstation or office listed in the space requirements document. Provide one circuit to a maximum of two double duplex receptacles feeding computers or workstations.
4. Communications Rooms:
 - a. Provide two dedicated unswitched receptacles on two separate 20A, 120V branch circuits.
 - b. Provide two 1.4 kVA UPS units for 7 minutes of backup.
 - c. Convenience receptacles: two duplex per room.
5. Provide one GFI duplex receptacles for each of the following locations:
 - a. Toilet rooms
 - b. Locker rooms
 - c. Janitor's closets
 - d. Each chemical containment pit in the cargo areas for portable sump pump
 - e. Provide exterior GFI duplex receptacles, at least two per building elevation.

C. Health and Safety:

1. Tested Materials:
 - a. Provide branch circuit elements in compliance with code and that are UL listed or labeled..

D. Operations and Maintenance:

1. Capacity: Provide branch circuit wiring with sufficient capacity to accommodate future growth and renovation without major rewiring.

- a. Lighting Circuits: Limit design loads to 75 percent of capacity permitted by code.
- b. Receptacle Circuits: Limit design loads to 75 percent of capacity permitted by code.
- c. Appliance Circuits: Limit design loads to 75 percent of capacity permitted by code.
- d. Equipment Circuits: Limit design loads to 100 percent of capacity permitted by code.

PRODUCTS

A. Branch Circuit Wiring:

1. Use single insulated copper conductors in conduits.
2. Provide a separate insulated grounded conductor and neutral conductor in each circuit. Neutral conductor shall not serve more than one circuit.
3. Do not use the following:
 - a. Aluminum conductors.
 - b. Metal clad cables.

B. Receptacle Cover Plates:

1. Use the following:
 - a. Material and Finish: Stainless steel, brushed.

C. Future System Furniture:

1. Where planned, provide wiring in junction boxes above the suspended ceiling in the area. Boxes shall be mounted one foot above the ceiling and clear of obstructions.
2. Circuit load capacities shall be as follows:
 - a. Provide minimum three general purpose circuits for each grouping of six cubicles.
 - b. Provide minimum one computer circuit for each grouping of two cubicles.

D. Provide receptacles with dedicated circuits to the following types of equipment:

1. Fax machines
2. Printers
3. Copiers
4. All other equipment as necessary

END OF CHAPTER D53

CHAPTER D7

TELECOMMUNICATIONS

PERFORMANCE

A. Basic Function:

1. Provide the following telecommunications services:
 - a. Voice and Data: Infrastructure for voice and data transmission.
 - b. Sound Reinforcement: Public address.
2. Where telecommunications elements also must function as elements defined within another element group, meet the requirements of both element groups.
3. In addition to the requirements of this chapter, comply with Unified Facilities Guide Specifications and all applicable requirements of Part III - Facility Performance and Chapter D - Services.
4. ***Suggested Tie-in Point to Existing Telephone/Data Distribution System: Nearest telephone/data utility pole on Atlantic Street. Contractor shall only provide underground conduits from the pole to the new AFT facilities. Dover AFB communications contractor will install telephone and data lines from the tie-in point(s) to the main communications rooms (one for each new AFT facility (main AFT and the Outsized Cargo/DCS/FTF/CDF).***

B. Health and Safety:

1. Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.
 - a. Control access to spaces housing electrical components and allow access only by qualified personnel.
 - b. Comply with NFPA 70-2002 requirements for hazardous locations applications.

C. Durability:

1. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250-1997 and:
 - a. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
 - b. Exterior, Exposed to Weather and Wind: Type 3S.
 - c. Exterior, Other Locations: Type 3R.
 - d. Interior, Subject to Settling Dust, Falling Dirt, or Dripping Liquids: Type 5.
 - e. Interior, Subject to Circulating Dust: NEMA Type 12.
 - f. Interior, Other Locations: Type 1.

D. Operation and Maintenance:

1. Capacity: Design systems to deliver required performance while operating within their intended ratings.
 - a. Substantiation:
 - 1) Construction: Testing of wiring systems for continuity, prior to functional performance testing.
2. Power Consumption and Efficiency:
 - a. Comply with requirements for energy efficiency of electrical equipment in ASHRAE 90.1-2001.
3. Ease of Use:
 - a. Zoning: Arrange wiring and protective devices so that outages caused by local faults do not affect unrelated areas or systems.
4. Allowance for Change and Expansion:
 - a. Spare Distribution Capacity: 25 percent, minimum.

AIR FREIGHT TERMINAL, DOVER AFB

PROJECT NUMBER: FJX043003
REQUEST FOR PROPOSAL
SOLICITATION NO: DACA61-03-R-0009
AMENDMENT NO. 0015

END OF CHAPTER D7

CHAPTER D71

VOICE AND DATA

PERFORMANCE

A. Basic Function:

1. Provide means of conveying voice communication between rooms and spaces in the building and between the building and the base campus area network as follows.
 - a. Point-to-Point Voice Communications For:
 - 1) Private two-way verbal communication.
 - 2) Group conversations among more than 2 stations, at user's option.
 - 3) Both handset and speaker operation, at user's option.
 - 4) Transfer of live call to another station, at user's option.
 - 5) Hands-free paging.
 - b. Recording and Management of Voice Messages:
 - 1) Incoming and internal messages.
 - 2) User-recorded reception message for each station.
 - 3) Automated answering of incoming voice telephone.
 - c. Connection between internal communications and public telephone system.
 - d. Automatic answering of incoming fax, from public telephone network;.
 - e. Point-to-Point Voice Stations: Required in the following spaces:
 - 1) Each interior room, minimum of one.
 - 2) Each entrance.
 - 3) Each stretch of corridor of 50 feet length or less.
 - f. Furnished by Owner:
 - 1) Telephone sets, controller, and switching software.
 - 2) Telephone recording hardware and software.
 - 3) Fax hardware and software.
 - 4) Private automatic branch exchange (PABX).
2. Provide means of conveying data between computers within the building, between buildings in the campus, and between the data transmission network and the Owner's Internet service provider as specified in the program and as follows.
 - a. Owner's operational computer network is PC- based.
 - b. Connection between Internet and internal network will be via ISDN line.
 - c. Connection between the network and the base campus area network shall be provided. Wiring outside the building structures will be provided by the Owner.
 - d. Operational network outlets shall be provided in the following spaces:
 - 1) Server Room, number as indicated in project program.
 - 2) Each interior room, minimum of one.
 - 3) Each reception desk.
 - 4) Each other location indicated as "computer outlet" or "workstation" on project program.
 - 5) Adjacent to each receptacle in every office listed on project program, **or at least one outlet for every 48 square feet of office space, whichever is the higher quantity.**
 - e. Furnished by Owner:
 - 1) Owner's operational computer network hardware and software, including servers, routers and hubs..
3. Where voice and data elements also must function as elements defined within another element group, meet the requirements of both element groups.
4. In addition to the requirements of this chapter, comply with Unified Facilities Guide Specifications and all applicable requirements of Part III - Facility Performance, Chapter D - Services, Chapter D7 - Telecommunications, and Dover Air Force Base specification section 16740.

5. Substantiation:
 - a. Preliminary Design: Outline description of systems, inter-system interfaces, and functions provided.
 - b. Design Development: Details of each type of input and output device; capacities of systems; manufacturer data.
 - c. Construction Documents: Detailed layout of input and output device locations.
 - d. Closeout: Complete functional performance testing.
- B. Amenity and Comfort:
 1. Accessibility: Comply with requirements of Americans With Disability Act for facilities for the disabled.
- C. Durability:
 1. Moisture Resistance and Thermal Compatibility: Materials that will resist degradation and failure of signals under ambient conditions expected.
- D. Operation and Maintenance:
 1. Owner Personnel Training:
 - a. Operational: Minimum of 16 hours, for 2 persons, for each separate system.
 - b. Maintenance: Minimum of 16 hours, for 2 persons, for each separate system.
 2. Telecommunications System Management Records. Telecommunications system labeling, management records, and drawings must comply with TIA/EIA-606. Existing base standard numbering practices may be used as long as they incorporate the following requirements: all outlets, patch panel positions, and cables must be labeled as to their function with a unique identifier code; and as-built drawings and management records must show the location of all outlets, equipment, and cabling. These records will form part of the base Communications and Information Systems Installation Records (CSIR) and must be delivered to the BCSO CSIR manager upon contract completion according to AFI 33-104, Base Level Planning and Implementation, and AFI 21-404, Developing and Maintaining Communications and Computer Systems Installation Records.
 - a. Outlets and Patch Panel Labeling. As a minimum, outlet and patch panel labeling must show the TC number serving the outlet and the outlet circuit number. The outlet number should reflect its relative physical location in the building. Circuit numbers should not incorporate telephone extension numbers since telephone numbers can be reassigned to different outlets in telephone switching equipment and are therefore subject to frequent change. Where several patch panels are located in a single TC, the numbering and labeling scheme must also show the number of the patch panel serving the outlet. Each individual jack must be labeled to show its function; top or left jack position must be designated for and labeled "PHONE," and bottom or right jack position must be designated for and labeled "DATA." All patch panels terminating copper cable must be stenciled with the panel number, the cable count, and whether terminations are wired to TIA/EIA-568-B termination configuration T568A (default) or T568B (by exception only) wiring standard. Fiber optic ports in patch panels must be labeled to show the transmit "TX" and receive "RX" port for each duplex set of fibers. Lettering on labels must be 0.25 inch high and machine-made; handwritten labels must not be used for permanent installation.
 - b. Distribution System Labeling. All transitions and changes in distribution system size and type must be labeled on the drawings. Each cabinet must be labeled at the top with a unique designation. All cables, patch panels, and cable terminations must be labeled.

PRODUCTS

- A. Wired LANs
 1. LANs will use switched Ethernet technology meeting the Ethernet and transmission media standards. Client jacks will be Category 5 (CAT 5)-rated or better Universal Service Order Code

(USOC) registered jack (RJ)-45, wired with CAT 5 or better four-pair unshielded twisted pair (UTP) cable in accordance with TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard. Terminate all client drops on CAT 5 or better-rated patch panels in telecommunication closets (TCs). ~~Install Ethernet switches in TCs or the communication equipment room CER. Connect client drops from the patch panel to the supporting switch with CAT 5 or better-rated patch cables. Connect the single building-level switch or switch/router with the point where the building connects to the base campus area network (CAN) at an information transfer node (ITN) with 12-strand FOC. In buildings with multiple switches, interconnect work group-level switches and the single building-level switch or switch/router with FOC.~~

2. Alternative technologies, such as asynchronous transfer mode (ATM)-based networks or wireless LANs, may be used where prior approval of the Owner is obtained. Wireless LANs will not be used as a substitute for a wired LAN infrastructure in new facilities, except where mobility of client computers is essential to operational effectiveness and approved by the Owner.

B. Telephone Systems

1. Single Line (Instrument) Concept (SLC). Telephone systems will implement the SLC and be capable of providing Integrated Services Digital Network (ISDN) services. Key systems will not be installed in new facilities. Terminate all subscriber lines in the new facilities, except point-to-point circuits such as fire alarms, on the facility telephone switch (private automatic branch exchange [PABX], remote switching terminal [RST], or other phone switch). In small buildings where a separate switching system is not justified, extend all switched circuits to the base dial central office switch.

C. Building Wiring Architecture. Building telecommunications (telephone and LAN) distribution systems must meet TIA/EIA-568-B, TIA/EIA-569-A, Commercial Building Standards for Telecommunications Pathways and Spaces, TIA/EIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, and TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications. Distribution systems shall be concealed. No exposed wiring will be permitted.

1. Distance Requirements. TIA/EIA-568-B allows a distance of 10-feet from the client outlet to the client end instrument (computer). It allows 295-feet from the client outlet to the TC. The cable length allowed in the closet is 23-feet. Therefore, the total length of a client circuit must be no greater than 328-feet.
2. CER. A facility that has significant communication systems requirements and is greater than 10,000 square feet in area must have a CER. The CER serves as the entrance facility for all incoming communications ducts and service and as the location for communication and information infrastructure such as the building PABX, RST, and LAN switches.
 - a. Details: Provide telephone outlets in the CER for desk mounted or wall mounted telephones as appropriate. The number of entrance telecommunication conduits shall be as follows:
 - 1) Building Usable Area (sq. ft.) <20,000; Number of 4-inch Entrance Conduits - 3
 - 2) Building Usable Area (sq. ft.) 20,000 to 100,000; Number of 4-inch Entrance Conduits - 4
 - 3) Building Usable Area (sq. ft.) 100,000 to 200,000; Number of 4-inch Entrance Conduits - 5
 - 4) Every additional 200,000 sq. ft.; Number of 4-inch Entrance Conduits - +1
 - b. Power Requirements. Provide a minimum of two dedicated un-switched 20-amp, 120-VAC, 60-Hz duplex receptacle power outlets, each on a separate branch circuit for communication equipment. Increase these minimum requirements as necessary to meet equipment loads. Support the equipment with UPS units. Provide additional 120-VAC convenience outlets for maintenance and housekeeping. Back-up all electrical loads in the CER with standby generator power.

- c. Ground Connections. Ground connections in the CER must meet National Fire Protection Association (NFPA) 70, National Electrical Code (NEC), and TIA/EIA-607 requirements. Provide a single-point ground for all communications/electronics equipment for the building within the CER. Provide a telecommunications main ground busbar (TMGB) (minimum of 6 inches high by 24 inches long) installed 7 feet above the floor on a wall (preferably an outside wall) within the CER. The ground riser from the ground plate to the single main electrical service entrance ground must be a No. 1 American Wire Gauge (AWG) or larger copper conductor directly connected to the ground plate with no taps. The resistance of the ground riser must be 5 ohms or less measured from the main building ground point. All connections of wire-to-wire and/or wire-to-ground rod must be exothermic-welded. Extend No. 6 AWG or larger copper ground wires from the CER ground plate to each TC within the building and connect a telecommunications grounding busbar (TGB) in the TC. Bond each TMGB and TGB to non-current-carrying metal building parts, such as metal framing, in the CER and TC as required by the NEC.
 - d. Building Entrance Terminals (BET) (Telephone). Provide gas protector modules in the cert to protect the inside plant wiring and equipment from voltage surges. Where the length of the outside plant cable from the point it enters the building to the BET is greater than 50 feet, install the outside plant cable in metal conduit and ground the conduit. Terminate twisted-pair outside plant cable on BETs at the point where it enters the building. Provide cross-connects from the BET to the inside wiring connection point.
3. TCs. Provide a TC for each 10,000 square feet of building area on each floor. The TC supports the functions outlined in TIA/EIA-568-B and serves to house the interface between the CER and client telephone and data outlets. It houses LAN networking equipment (e.g., Ethernet switches and patch panels) for client outlets served from the TC. A TC may serve as the CER for buildings less than 10,000 square feet in area.
- a. Details. TCs must be dedicated spaces not shared with other functions (i.e., building electrical or mechanical utilities). TCs must be located centrally in the area they serve and sized in accordance with TIA/EIA-569-A. TCs on successive floors must be vertically stacked. A minimum of three 4-inch rigid steel conduits must be installed between stacked closets on successive floors in accordance with TIA/EIA-569-A. All conduit and other penetrations through fire-rated walls, ceilings, and floors must be fire-stopped in accordance with the NEC. As a minimum, the TC should have 0.75-inch plywood backboards on all walls, from no greater than 1 foot above the finished floor level to no less than 7 feet above the finished floor level. Floors, walls, and ceilings must be treated to eliminate dust. Finishes must be light in color to enhance room lighting. Provide an outlet for a wall-mounted telephone installed near the entry door.
 - b. Power Requirements. Provide a minimum of two dedicated un-switched 20- amp, 120-VAC, 60-Hz duplex receptacle power outlets, each on a separate branch circuit for communication equipment. Increase these minimum requirements as necessary to meet equipment loads. Support the equipment with UPS units. Provide additional 120-VAC convenience outlets for maintenance and housekeeping. Backup all electrical loads in the TC with standby generator power.
 - c. Grounding. All TCs must be connected to a single-point ground in the CER in accordance with TIA/EIA-607 (see paragraph 8.3.3.2.4).
4. Equipment Racks. Equipment racks must be 19 inches wide and mounted on the floor. Locate racks near the point where outside plant cable enters the building in CERs and center of the room in TCs. If mounting requirements for oversize equipment is anticipated, 23-inch wide racks may be substituted. In narrow or crowded closets, equipment racks may be mounted adjacent to a wall, but must provide a minimum of 36-inches of space both in front and behind the rack. Where added physical protection is required for terminations, data equipment, and patching, 19-inch equipment cabinets may be used. Ground all racks and cabinets.
5. Cable Rack. Channel-type cable rack must be used in TCs and CERs to provide distribution raceway between telephone backboards, equipment racks, riser conduits, and distribution cable

trays.

6. Copper Cable Terminations:
 - a. Copper Distribution Cable Termination. All copper distribution cable (riser cable and subscriber drops) used for telephone or data circuits must be terminated in TCs and the CER on 110-type CAT **6 5** or better rated termination patch panels mounted in an equipment rack. Terminations must be wired to TIA/EIA-568-B termination configuration T568A. Telephone and data cables must not be intermingled; provide separate patch panels for each. On small installations where multiple patch panels are not justified, group telephone cables together and separate them from data cable groupings. Label all cables, patch panels, and terminations consistent with the building or the base overall cable management numbering system as required by the base communications systems officer.
 - b. Copper Telephone Patch Cables. Telephone patch cables must be 4-pair No. 24 AWG stranded UTP and have a standard 8-pin/8-position USOC RJ-45 type connector on one end and a termination compatible with the incoming telephone circuit block or panel on the other end. Telephone patch cables shall have the same category rating as data patch cables used in the facility to simplify housekeeping and inventory, and preclude the need to differentiate between two kinds of patch cables.
 - c. Copper Data Patch Cables. Data patch cables must be factory-assembled 4-pair No. 24 AWG stranded CAT **6 5** or better UTP and have a standard 8-pin/8-position USOC RJ-45 type connector on one end and a termination compatible with the incoming data circuit block or panel on the other end.
7. FOC Termination.
 - a. All FOC used for distribution must be terminated in rack-mounted patch panels. Duplex patch cables must be used. Termination of FOC shall be in enclosed 19 or 24-inch cabinets to provide greater protection.
 - b. Fiber optic patch cables must be factory-assembled using single coupling SC-type FOC connectors.
8. Cabling and Wiring:
 - a. Horizontal Cable (Telephone and Data). Horizontal cables connect individual subscriber telephone and LAN outlets to their respective 110-type patch panels in the TC. Horizontal cable for both telephone and LAN (data) must be 4-pair No. 24 AWG solid copper, 100 ohm, CAT **6 5** or better UTP cable. Use only cable that has passed the Underwriters Laboratory (UL) network certification program and is UL-listed and -labeled. Group telephone cables separately from LAN cables.
 - b. Riser Cable (Telephone). Telephone riser cables provide connection between the telephone patch panel in the TCs and the telephone patch panel or main distribution frame in the CER. Telephone riser cable must be multi-pair (sized as required to support all horizontal cables terminated in the TC plus 50% spare pairs) No. 24 AWG solid copper, 100 ohm, CAT 3 UTP cable. They must meet the requirements of TIA/EIA-568-B.
 - c. Riser Cable (LAN). Fiber optic network riser cables provide connectivity between the LAN workgroup-level switches in the TCs and the LAN patch panel in the CER. LAN riser cable must be 12-strand, 62.5/125-micron multi-mode FOC. The cable riser must be terminated in a patch panel with duplex SC-type connectors installed in an equipment rack or cabinet.
 - d. Outside Plant Cable. Telephone outside plant cable provides connection between the telephone main distribution frame or 110-type patch panel in the CER and the point where the facility connects to the base telephone network (typically the dial central office or an RST in another building). Data outside plant cable provides connection between the intra-building LAN main Ethernet switch/router and the point where the facility connects to the base CAN (typically the NCC or an ITN). Outside plant cable connectivity consists of both single-mode FOC (for data) and multipair metallic cables (for telephones). Cables will be provided by the Owner.
9. Standard Telecommunications Outlet. The standard outlet must consist of one 6-pin/6-position telephone jack and one 8-pin/8-position CAT **6 5** or better modular USOC RJ-45 data jacks

mounted in a single faceplate in a factory-made assembly with (or collocated with) two duplex 120-VAC, 60-Hz power receptacles. Telephone and data jacks must be nonkeyed unless the user requires keyed connectors to maintain system uniformity, security, or other user-specified reasons. The power outlet circuits must be based on a loading assumption that each location of two duplex receptacles will power one personal computer with a monitor along with typical office appurtenances such as task lights; also assume that there will be no diversification of this load.

- a. All administrative facilities and administrative spaces in other types of facilities must be equipped with one standard telecommunications outlet for each 48 square feet of net office space. Outlet densities and locations for all special-purpose spaces and non-administrative facilities shall be in accordance with the program and must follow the guidelines in TIA/EIA-569-A.
10. Pay Phone Outlet. Pay phone outlets must consist of one 8-pin/8-position CAT 3 or better modular USOC RJ-45 non-keyed jack in a single gang outlet faceplate. Locate pay phone outlets in common-use areas where illustrated in the program.
11. Furniture Systems Support Wiring. Telephone and data wiring systems in areas with pre-wired workstations, furniture systems, or modular walls must have sufficient flexibility and connectivity to enable rearrangement without modifications to the permanent communications and data wiring in the facility. Suitable connectors must be provided; permanent splices/connections are prohibited.
12. Conduits: Unless supported on cable racks, install all voice and data wirings in rigid conduit with plastic junction boxes. ***Contractor shall comply with NFPA70, Art, 314.3.***

METHODS OF CONSTRUCTION

- A. Testing: All metallic and fiber optic cabling must be tested end-to-end and certified to meet TIA/EIA performance standards. All equipment must be tested to meet contract specifications. All test results and certifications must be provided in a report upon completion of construction to the BCSO responsible for system O&M.

END OF CHAPTER D71

CHAPTER G3**SITE SERVICES****PERFORMANCE****A. Basic Function:**

1. See Chapter D for basic requirements for services.
2. Provide the following site services:
 - a. Water Supply (**G31**): Means of supplying water for all purposes required in buildings and on site. See Chapter D2, and Chapters D2 and D21 for additional requirements.
 - b. Sanitary Sewer (**G32**): Means of removing liquid waste generated in buildings on site. See Chapters D2 and D24 for additional requirements.
 - c. Storm Sewer (**G33**): Means of removing rainwater runoff from buildings and site areas. See Chapters D2 and D25 for additional requirements.
 - d. Site Elements of Energy Supply: See Chapter D31 for means of receiving natural gas for energy-using services.
 - e. Site Elements of Heating and Cooling Distribution: See Chapter D35 for means of conveying ~~steam and condensate~~, heating water, and chilled water to all buildings on site.
 - f. Electrical Power (**G34**): Adequate supply of power for project functions. See Chapters D5 and D51 for additional requirements.
 - 1) Provide underground electrical distribution system for all buildings on site.
 - g. Site Elements of Artificial Lighting: See Chapter D6 and D62.
 - h. Site Elements of Telecommunications: See Chapter D7, D71, and D72. Install three (3) 4" conduits from Atlantic Street along 8th Street to the New AFT Building for new communications lines. These lines will then be distributed to other buildings from the new AFT Building.
 - i. Site Elements of Surveillance and Security Controls: See Chapter D9 and D92.
3. Where site services elements must also function as elements defined within another element group, meet requirements of both element groups. All utilities shall be installed underground.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Part III - Facility Performance, Chapter D - Services, and Chapter G - Site Work.

B. Amenity and Comfort:

1. Leakage: Provide distribution systems which are leak-free.
2. Accessibility: Provide clearances around components that are adequate for service and use.

C. Health and Safety:

1. Safety Hazards: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.
2. Unauthorized Access: Provide locking devices to stop unauthorized access, vandalism, and sabotage.
3. Excess Pressure: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.
4. Electrical Shock: Isolate electrical conductors from personnel.
5. Accidental Explosion: Provide equipment designed to withstand electromotive forces without catastrophic failure.
6. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.

7. Hazardous Materials: Piping carrying flammable liquids and toxic materials clearly labeled.
 8. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.
- D. Structure:
1. Concealed or Buried Piping and Components: Design cover or concealment so that they are not subjected to damaging stresses due to applied loads.
 2. Supports for Piping and Components: Support piping and components using the following:
 - a. Supports that allow movement of the pipe without undue stress on the piping, tubes, fittings, components, or foundations.
 - b. Substantiation:
 - 1) Design Development: Details of supports, including engineering analysis.
 3. Structural Design of Components and Their Supports: In accordance with code.
 - a. Safety Factor for Component Structural Elements: Two; based on weight of component.
 - b. Anchors: Securely and positively attach piping to supports.
- E. Durability:
1. Service Life Span: As specified in Chapter D.
 2. Service Life Span: Same as the service life of the building, except as follows:
 - a. Piping: Same as service life of building.
 - b. Piping and Components Permanently Installed Underground or Encased in Concrete: Same as service life of building.
 - c. Shut-Off Valves and Similar Components: Same as service life of building.
 - d. Shut-Off Valves and Similar Components: Minimum 10 years.
 - e. Hydrants: Same as building service life.
 - f. Electrical Equipment: Minimum of 10 years without failure.
 3. Weather Resistance:
 - a. Storage Tanks and Distribution Components: Prevent freezing. Provide automatically controlled supplemental heating.
 - b. Burial Depth of Piping: 6 inches below lowest recorded level at which the ground freezes. Minimum burial depth of 12 inches.
 - c. Electrical Equipment: Provide equipment which is resistant to water penetration.
 4. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
 - a. Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
 - b. Underground Elements: Provide supplementary protection for underground metal pipes and tanks, sufficient to prevent corrosion completely, for the service life of the element without maintenance.
 - 1) 3 inches of concrete cover is considered to be permanent protection.
 - 2) Bituminous or other waterproof coating or wrapping is considered permanent protection unless cathodic protection is required and unless underground element is subject to movement due to structural loads or thermal expansion or contraction.
 - 3) Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements falling under these criteria:
 - a) Metal elements are submerged or buried in a soil environment known to cause corrosion on similar nearby structures.
 - b) Metal elements are submerged and buried in a soil environment in which stray DC electrical currents are present.
 - c) Metal piping carrying petroleum products or other hazardous or toxic materials is

- buried or otherwise installed without means of visual observation of entire exterior surface of piping.
- d) Metal tank holding petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of tank.
- 4) See Chapter D94 for cathodic protection requirements.
- 5. Resistance to Accidental Damage and Abuse:
 - a. Provide barriers or protected locations for services, to prevent damage due to vehicular traffic.
 - b. Buried Components: Minimum of 12 inches below surface of ground.
 - c. Underground Piping: Watertight and rootproof.
- F. Operation and Maintenance:
 - 1. Capacity:
 - a. Water and Drainage: As required by code and as specified in Chapter D2.
 - b. Heating, Cooling, and Ventilating: Provide site services sufficient to maintain interior environment within ranges specified in Part III.
 - c. Fire Protection: As required by code and as specified in Chapter D4.
 - d. Substantiation:
 - 1) Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
 - 2) Design Development: Engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements.
 - 3) Construction Documents: Complete system details.
 - 4) Construction and Closeout: Functional performance testing, as specified in Section 01701.
 - 2. Ease of Use: Provide easy access to and working clearances around system components.
 - 3. Minimization of Misuse: Provide locking devices to stop unauthorized access, vandalism, and sabotage.
 - 4. Ease of Maintenance:
 - a. Piping: Provide means of isolating portions of piping system, so that small portions may be shut down leaving the remainder in operation, by using isolation valves located so that drainage of the entire system is not required for repair.
 - 5. Provision for Change and Future Capacity:
 - a. Provide electrical equipment which can be modified to increase service capacity in the future.
 - 6. Maintenance Service: Maintain services including periodic inspections, routine maintenance recommended by manufacturers, and repair and replacement of defective elements; maintenance is required only for systems so specified.

PRODUCTS

Underground chilled and hot water pipes: Steel pipe conforming to ASTM A 53 with scotch wrap primer and scotch wrap tap minimum 10 mil thick, 2 inches wide with overlapping spiral 1-inch. The insulation shall be polyurethane foam meeting the requirements of ASTM C 591. Provide all necessary pipe, insulation, casing, end seals, and fittings. Substitutions such as copper pipe are acceptable but shall meet ASTM B 88 type K or L.

~~METHODS OF CONSTRUCTION~~

END OF CHAPTER G3

SPACE DESCRIPTION	NET AREA (SF)	ACTIVITY GROSS AREA (SF)	TOTAL GROSS AREA (SF)	REMARKS
I. <u>Terminal Building</u>			323964	
A. <u>Cargo Processing Bays</u>		146,200		Elevated floor
1. Import Area				Area for breaking down of inbound palletized cargo
2. Export Area				Area for palletizing outbound cargo.
3. Refrigerated Storage Area	1400			Pallet jack or folk lift will set cargo on gravity roller conveyor that with transport this cargo onto a ball transfer conveyor, This conveyor will allow the user to move the cargo around the space prior to transporting it into the (4) level pallet storage area Minmum height: 10'-0".
4. Mechanical Room	540			Direct outside access.
5. Fire Pump Rooms	800			(2) 20' X 20' rooms, one on each side of the cargo processing area. One pump per fire pump room.
6. Electrical Room	450			Also, allow wall space for panelboards, and small transformers which can be placed against the walls and protected by bollards.
7. Packing & Crating (1) Office (1) Office (1) Caged Area	100 130 5000			Provide 10'-0" high chain link fence, with 10' wide by 10' high sliding chain link gate.
8. Recoop Shop	1200			Locate within the Packing & Crating Area. Woodworking Shop
9. Office for (3) Workstations	200			Locate in Import Area.
B. <u>Covered Storage Area</u>		113955		
1. Covered Staging Docks	35880			
2. (4) Level Pallet Storage	40950			* Net Area is footprint.
3. ALOC/Code "J" Dock	7125			Area for shipping cargo already palletized.
4. Outsized Cargo Facility, with (2) Level Multi-pallet Train Storage System	30000			* Net Area is footprint.
C. <u>Special Handling Area</u>	21140	43000		Area for storing, palletizing and shipping hazardous cargo which cannot be processed in Import/Export Processing Bays
1. Offices	1200			Locate on Mezzanine.
-(1) Supervisor, E7	100			CSB, Training and Dispatch Areas shall be in (1) Open Office.

SPACE DESCRIPTION	NET AREA (SF)	ACTIVITY GROSS AREA (SF)	TOTAL GROSS AREA (SF)	REMARKS
7. Mechanical Room	1800			Direct outside access.
8. Fire Pump Room	400			
9. Electrical Rooms				
(1) Electrical Room - First Floor	240			
(1) Electrical Room - Second Floor	77			
10. Communications Room	300			
11. Circulation	3000			
L. <u>46th Aerial Port Squadron (Reserve)</u>	2397	2876		Separate entrance
1. Orderly Room	490			Space for counter, (6) workstations and closet storage
2. Offices				
(1) NCOIC	140			(4) workstations
(1) Commander	175			
(1) First Sergeant	110			
(1) Adv.	95			
(1) Art.	160			(4) workstations
(1) QC	140			(3) workstations
(1) CBT	140			(2) Tables with (3) occupants per table
(1) OPS	180			(3) workstations and (1) table for (6) people
(1) Training	335			(9) people
(1) Copy Room	40			
(1) MOB Room	140			(5) workstations
(1) MOB Supplies	220			(1) workstation
3. Kitchenette	32			
III. Landside Administrative Block			7800	
A. <u>Air Freight Flight</u>	1080	1296		
1. Export Cargo Offices				
(1) Supervisor, E7	100			
(1) Supervisor, E6	100			
(1) Briefing Room	480			Space for (2) technician's desk.
				(1) small table with (6) chairs.
				(2) workstations for computer based training.
				(3) filing cabinets.
2. Import Cargo Offices.				
(1) Supervisor, E7	100			
(1) Supervisor, E5-E6	200			

SPACE DESCRIPTION	MECHANICAL REMARKS
B. <u>Covered Storage Area</u>	Cooling: Yes (no cooling for caged area) Outside Air: 20 cfm per person
1. Covered Staging Docks	Heating: No Cooling: No
2. (4) Level Pallet Storage	Heating: No Cooling: No Ventilation Air: (4) (4) air changes. Maintain space temperature no more than 10 degrees F above outside air temperaure in summer.C583
3. ALOC/Code "J" Dock	Heating: No Cooling: No
4. (2) Level Multi-pallet Train Storage System	Heating: No Cooling: No Ventilation Air: (1) air change
C. <u>Special Handling</u>	
1. Offices	
-(1) Supervisor, E7	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
-(1) Supervisor, WS8	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
-(1) Supervisor, Ops. NCO, E5-E6	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
-(1) CSB Area with (2) workstations	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person

SPACE DESCRIPTION	MECHANICAL REMARKS
8. Fire Pump Room	Heating: Yes Cooling: No Ventilation Air: Yes (-50 cfm per sq. ft.)
9. Electrical Rooms (1) Electrical Room - First Floor (1) Electrical Room - Second Floor	Heating: Yes Cooling: Yes (85 degrees F max.) Ventilation Air: Yes
10. Communications Room	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person Ventilation Air: Yes
11. Circulation	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
M. <u>46th Aerial Port Squadron (Reserve)</u>	
1. Orderly Room	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
2. Offices (1) NCOIC (1) Commander (1) First Sergeant (1) Adv. (1) Art. (1) QC (1) CBT (1) OPS (1) Training (1) Copy Room (1) MOB Room (1) MOB Supplies	Heating: Yes Cooling: Yes Outside Air: 20 cfm per person
3. Kitchenette	Heating: Yes

SPACE DESCRIPTION	PLUMBING REMARKS	FIRE PROTECTION REMARKS
	safety shower. Provide water for parts washer. Provide floor drain. Provide sink. Provide air compressor to deliver 120 psi air pressure with hard pipe system. The air compressor shall provide a min. of 55 cfm. Waste water from parts washer shall be contained and disposed of off site in accordance with EPA requirements.	Occupancy: Ordinary Hazard Group II
9. Office for (3) Workstations	None	System Type: Wet pipe Occupancy: Light Hazard
B. <u>Covered Storage Area</u>		
1. Covered Staging Docks	None	System Type: Dry pipe Occupancy: Extra Hazard Group I
2. (4) Level Pallet Storage	None	System Type: Dry pipe Occupancy: Extra Hazard Group I
3. ALOC/Code "J" Dock	None	System Type: Dry pipe Occupancy: Extra Hazard Group I
4. Outsized Cargo Facility, with (2) Level Multi-pallet Train Storage System	None	System Type: Dry pipe Occupancy: Extra Hazard Group I
C. <u>Special Handling Area</u>		
1. Offices	None	System Type: Wet pipe Occupancy: Light Hazard
- (1) Supervisor, E7 - (1) Supervisor, WS8 - (1) Supervisor, Ops. NCO, E5-E6 - (1) CSB Area with (2) workstations - (1) Training Area - (1) Dispatch Area		
Unisex Toilet	Provide ADA compliant water closet and	System Type: Wet pipe

SPACE DESCRIPTION	PLUMBING REMARKS	FIRE PROTECTION REMARKS
6. Briefing Room	None	System Type: Wet pipe Occupancy: Light Hazard
D. <u>Computer Operations Section</u>		
1. -Workspace for (1) supervisor, GS8 and staff, E5	Provide drainage for preaction system in an adjacent fire rated closet	System Type: Wet pipe Occupancy: Light Hazard
E. <u>Squadron Auditorium</u>	None	System Type: Wet pipe Occupancy: Light Hazard
F. <u>Air Freight Flight</u>		
1. (5) management/supervisory offices: - (1) 04 - (1) E8 - (1) Operations Supervisor, E7 - (2) Civilian administrators, GS5 and GS4	None	System Type: Wet pipe Occupancy: Light Hazard
G. <u>Customer Service, Service Liaisons and Air Lift Clearance Authority</u>		
1. CSB Supervisory Offices (1) Lieutenant, OIC (1) GS11 (1) GS12	None	System Type: Wet pipe Occupancy: Light Hazard

SPACE DESCRIPTION	PLUMBING REMARKS	FIRE PROTECTION REMARKS
3. Entrance Lobby	None	System Type: Wet pipe Occupancy: Light Hazard
4. Elevator Machine Room	None	System Type: Wet pipe independently supervised Occupancy: Ordinary Hazard Group I
5. Toilets (2 sets)	Provide ADA compliant water closets and lavatories (male and female)	System Type: Wet pipe Occupancy: Light Hazard
6. Breakroom	Provide ADA compliant sink	System Type: Wet pipe Occupancy: Light Hazard
7. Mechanical Room	Provide floor drain and hose bibbs	System Type: Wet pipe Occupancy: Ordinary Hazard Group I
8. Fire Pump Room	Provide floor drain	System Type: Wet pipe Occupancy: Ordinary Hazard Group I
9. Electrical Rooms (1) Electrical Room - First Floor (1) Electrical Room - Second Floor	None	System Type: Wet pipe Occupancy: Ordinary Hazard Group I
10. Communications Room	None	System Type: Wet pipe Occupancy: Light Hazard
11. Circulation	None	System Type: Wet pipe Occupancy: Light Hazard
M. <u>46th Aerial Port Squadron (Reserve)</u>		
1. Orderly Room	None	System Type: Wet pipe Occupancy: Light Hazard
2. Offices	None	System Type: Wet pipe

SPACE DESCRIPTION	PLUMBING REMARKS	FIRE PROTECTION REMARKS
3. Toilets	Provide ADA compliant water closets and lavatories (male and female)	System Type: Wet pipe Occupancy: Light Hazard
4. Reception Area	None	System Type: Wet pipe Occupancy: Light Hazard
5. Mechanical Room	Provide floor drains and hose bibbs	System Type: Wet pipe Occupancy: Ordinary Hazard Group I
6. Electrical Room	None	System Type: Wet pipe Occupancy: Ordinary Hazard Group I
7. Communications Room	None	System Type: Wet pipe Occupancy: Light Hazard
IV. Flightline Administrative Block		
A. <u>Air Terminal Operations (ATOC)</u>	Provide drainage for preaction system in an adjacent fire-rated closet	System Type: Wet pipe Occupancy: Light Hazard
1. Flight Offices -(1) 04 -(1) E7 -(1) E6 -(1) Secretarial Staff	None	System Type: Wet pipe Occupancy: Light Hazard
2. Capability Forecasting (1) E6	None	System Type: Wet pipe Occupancy: Light Hazard

SPACE DESCRIPTION	ELECTRICAL SPACE REQUIREMENTS		
	LIGHTING AND SURVEILLANCE	POWER	COMMUNICATIONS
4. Mechanical Room		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
5. Fire Pump Rooms		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
6. Electrical Room		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
7. Packing & Crating			
(1) Office			
(1) Office			
(1) Caged Area			
8. Recoop Shop	General Illumination: Dusttight fluorescent luminaires suitable for Class III environment. Minimum 30 FC horizontal illumination 2'-6" AFF	One 208/120V branch circuit panelboard located outside the space. Power to dust collector, radial arm saw, band saw, table saw, grinder, lathe and drill press. Terminations, boxes and fittings shall be dusttight suitable for Class III environment. Provide 6 outlets spaced throughout the shop area.	
9. Office for (3) Workstations			
B. <u>Covered Storage Area</u>			

SPACE DESCRIPTION	ELECTRICAL SPACE REQUIREMENTS		
	LIGHTING AND SURVEILLANCE	POWER	COMMUNICATIONS
3. Entrance Lobby			
4. Elevator Machine Room		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
5. Toilets (2 sets)			
6. Breakroom		Convenience receptacles: Provide one duplex receptacle for every 10 FT of wall space.	Three standard voice/data outlets.
7. Mechanical Room		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
8. Fire Pump Room		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
9. Electrical Rooms		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
(1) Electrical Room - First Floor		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	
(1) Electrical Room - Second Floor		Convenience receptacles: One duplex receptacle every 20 FT of wall space.	

ATTACHMENT 1 - COURIER STATION DESIGN

MISSION:

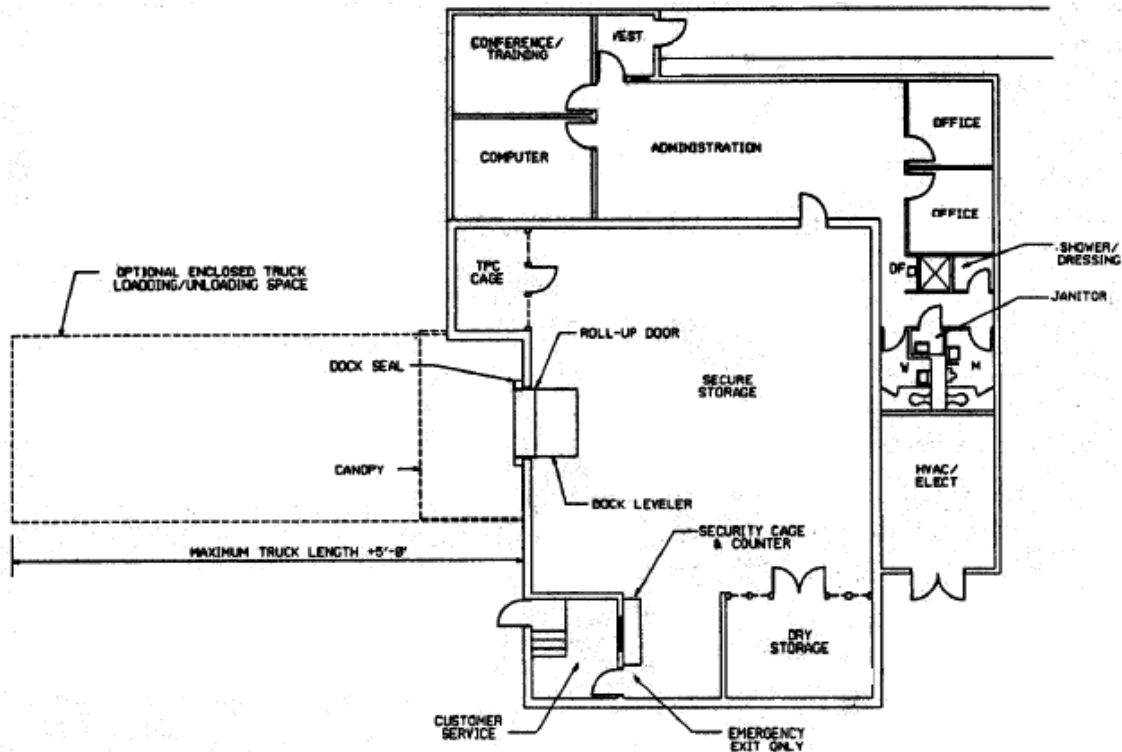
DCS Station-Dover will receive classified material, then consolidate and ship material to other courier stations for distribution to a final destination. Courier station operation centers on the secure storage area where all material is palletized or pouched and temporarily stored until shipment. The secure storage area is a Sensitive Compartmented Information Facility (SCIF), which must be designed and constructed according to DCID 6/9. Before the station may be used as a SCIF it must receive a certification from the Defense Intelligence Agency.

DESIGN GUIDELINES:

~~US personnel with proper security clearance will perform design and construction under strict supervision.~~ Only U.S. citizens shall design the intrusion detection system. Courier station design will be based on efficient functional concepts while providing a layout consistent with current security policies. The following table and diagrams provide programming guidance for planning DCS Station-Dover. They do not represent the only solution, nor do they necessarily represent the best solution. Siting and local conditions will have considerable impact on building design.

Table 1. Courier Station Space Allowance

<u>Station Space</u>	
* Personnel Assigned	7
Administrative Area	820SF
Computer Room	150SF
Customer Service Area	120SF
Dry Storage	160SF
Shower/Dressing Room	50SF
<u>Secure Storage Area</u>	<u>1100SF (10 Pallet Spaces)</u>
Total	2400SF

Figure 1. Station Suggested Floor Plan

UNIQUE REQUIREMENTS:

The following is a list of unique requirements for DCS Station-Dover:

- Interior detection system
- Closed circuit television
- GSA Class V door for SCIF entrance
- Roller System for ~~10~~ 6 pallets
- Roll-up door
- Construction standards specific for a SCIF
- Customer Service Vestibule
- Access control system
- Back-up power
- Polycarbonate windows

The SCIF access will open directly into secure storage area containing facilities for truck loading. Facilities for truck loading may be either a raised loading dock or the processing area could be at grade to allow driving vehicles into the loading area. Truck docks will be

protected from the weather by a canopy or may be totally enclosed when approved by the Commander, Defense Courier Service. Truck loading facilities will be determined on an individual basis as required by the vehicle types serving the courier station. The length, width, and height of secure storage areas should provide maneuvering clearances for forklift uses, storage for pallets boxes, and airline containers. A two-person control cage (TPC cage) is required in all secure storage areas. The secure storage areas will have only one point of entry, which will be through the administration area and will provide controlled access. All normal egress shall also be through this door. The truck entrance roll-up door can only be opened from within the secure storage area. Where secure storage areas are large enough to require two means of egress for personnel safety, an emergency exit will be provided through the security cage/customer service entrance and be located as remotely from the administration area as is reasonable. Lighting level will be uniform and adequate for personnel to easily read package labels.

Administrative areas will be located so that a line of sight is established between the administrative area and the SCIF door. The line of sight should permit personnel in the administrative area to view all persons entering or leaving the SCIF. Vestibules are considered part of the administrative area and vestibules will contain a pass window for checking credentials of personnel entering the courier station.

CONCLUSION:

Construction Standards will conform to the data found in DCID 6/9 and those standards and specific criteria noted in DCSI 2000.1. The DCS engineering staff will provide technical assistance on the application on the before mentioned guidelines.

ATTACHMENT 2 - DESIGN REQUIREMENTS FOR DCS STATION DOVER

SITE CRITERIA

DCSS Dover should be located near the flight line with direct access to both the flight line and a paved roadway. Where possible, station should be sited with provisions for the following:

- Access to the flight line
- Security response access
- Vehicular turning radius
- Parking
- Parking for station personnel and customers
- Access to utilities including water, sewage, electricity, telephone, and gas lines
- Access to the air cargo terminal
 - Air cargo personnel usually transport our pallets between the DCS station to/from the airplane.

FUNCTIONAL AREAS

DCSS Dover requires the following functional areas:

- SCIF
- Administrative Area
- Commander's Office
- Customer Service Vestibule
- Bathrooms/Shower/Lockers
- Break Room
- Utility Closet
- General Storage Closet
- Dry Storage

SCIF

The SCIF (Sensitive Compartmented Information Facility) is used for open storage of DCS material. The SCIF needs to accommodate 463L pallets (108" x 88" x 96") and the forklifts that transport them. The SCIF must have space for building and breaking-down pallets. Accommodations for six pallet positions on a roller system and two pallet positions on open floor space. The SCIF must also have space for the administrative processing of material, including mission planning and preparation, and packaging material storage (shelving).

SCIF must be constructed in accordance with Director Central Intelligence Directive (DCID 6/9), "Physical Security Standards for Construction of Sensitive Compartmented Information Facilities". SCIF must comply with STC 45 sound rating.

- Pedestrian entrance door and exit-only door
 - SCIF shall have one interior pedestrian door (connected to administrative area)
 - All other doors must be (emergency) exit-only with deadlocking panic hardware on the inside and with no hardware on the exterior
 - Exit-only doors should be equipped with a local annunciator in order to alert people working in the area that someone exited the facility under emergency conditions
 - The SCIF entrance doors must be equipped with automatic door closers
 - Solid core metal-clad fire doors
 - Minimum of 16-gauge metal
 - Minimum of 1 ¾ inches thick
 - GSA approved combination lock that meets Federal Specification FFL 2740 (Assistant Secretary of Defense letter dated 19 Oct 93, Subject: Combination Locks for the Protection of Classified Material states the Mas-Hamilton X-07/08 lock is currently the only acceptable lock)
 - Requires 2 high security hasps to allow locking high security padlock
- Roll-up doors
 - One roll-up door required leading to the roller system or open warehouse in the adjoining freight terminal facility
 - Insulated and weather-stripped for weather and noise attenuation
 - Day Gate in front of roll-up door
 - 13' height clearance through door to accommodate forklift with pallet
 - Minimum 16 gauge steel
 - Minimum 13' width clearance
 - Capability to use high security padlock on each side (inside) of door (two locks on door)
 - Recommend a hasp welded near bottom edge of door on each side matched up to a hasp welded on each side of frame
 - Electric-powered door with safety mechanism
 - A manual means to open door during power failure
 - Mechanical assistance such as a chain or crank

- Slope of ramp to begin at threshold of roll-up door to prevent rain from flowing into vault
- Floor, wall, and ceiling construction must be in compliance with DCID 6/9
- Concrete floors
 - Treated to prevent concrete dust
 - Non-skid
- No false ceiling
- No windows
- Minimum 14' clearance from floor to ceiling lights, sprinklers, and vents to allow for pallet build-up and break-down
- Concrete Masonry Unit (unfilled and non-reinforced) walls
 - Painted or stained
- All construction must be done in such a manner as to provide visual evidence of unauthorized penetration
- No columns or posts in vault
- Lighting throughout vault
 - Same intensity as in an office to allow couriers to read typed material
- Light placement should minimize effect of shadows cast by pallets and other tall items stored in the vault
- Duplex outlets every 10' along walls at 4' height
- Insulated throughout for weather and noise attenuation
- Need HVAC for normal office temperatures
 - Capability to bring in fresh air, even when heating or cooling is not needed
 - High volume air exchange to clear forklift fumes from air
 - Location of ducts/vents and performance of system to avoid alarm activation during non-duty hours
- Any penetrations (such as for ventilation ducts) in excess of 96 square inches (with one edge greater than six inches) must be blocked with bars, grills, or baffles
 - An approved IDS may be installed in lieu of bars or grills
 - An access port must be installed to allow visual inspection of the protection in the vent or duct

- Built-in roller system for pallets
 - Omni-directional rollers to accommodate at minimum ~~four~~ **six 463 436L** pallets
 - Roller system to begin immediately inside rollup door
 - Roller system to accommodate forklift tines (recessed areas) such that forklift can drive pallet directly into vault for unloading
 - Include roller system in design/construction – integral to facility and operations
- Two Person Control (TPC) cage must be installed
 - Twelve square feet of floor space
 - Approximately 8' high
 - Minimum 16 gauge wire cage with top
 - Holes no larger than 2" x 2"
 - Capability to lock with 2 locks
 - Hasps should be of equivalent strength to the cage
- Areas for segregating DCS material and storage of packaging and boxing materials
 - Built-in shelves along 2 walls (maximize shelving along walls)
 - Shelving for packaging and boxing materials 30" height o.c. and 30" deep
 - Shelving for DCS material 18" height o.c. and 24" deep

ADMINISTRATION OFFICE

The Administration office includes areas for general office administration, storage of technical manuals and regulations, office supplies and files, courier workstations and printers, computer workstations, fax machine, telephone answering machine, and copier machine. Design for one workstation per courier authorized, plus shared workstations for use of shared computers.

- High quality carpeting
- Suspended ceiling
 - 2' x 2' ceiling tiles
 - With recessed lights
- Painted gypsum walls
- Chair rail molding (stained)
- Vinyl wall covering below chair rail molding
- Wood baseboards (stained)
- 4-plex outlets every 6', minimum 2 outlets per wall
- Built-in coat closet with doors
- Dry Erase Board installed

COMMANDER'S OFFICE

Private office for the Commander to provide feedback and counsel station personnel.
Provides privacy for telephone conversations to DCS Headquarters and DCS customers.

- High quality carpeting
 - Suspended ceiling
 - 2' x 2' ceiling tiles
- With recessed lights
- Painted gypsum walls
- Chair rail molding (stained)
- Vinyl wall coverings below chair rail molding
- Wood baseboards (stained)
- Door which can be locked
- Duplex outlets every 6', minimum 2 outlets on each wall

CUSTOMER SERVICE VESTIBULE

The vestibule serves as the customer service area and should be sited on the non-flight line side of the building. The vestibule should be large enough to accommodate four people with packages, considering two accounts may show up at the same time with two people each. Additional guidance is found in Defense Courier Service Instruction DCSI 2000.1 Annex E.

- Door to exterior to be solid core metal-clad
 - Minimum 16 gauge metal
 - Minimum 1 ¾ inches thick
- Durable, attractive, low maintenance, non-slip tile floors
- Suspended ceiling
 - 2' x 2' ceiling tiles
 - With recessed lighting
- Painted gypsum walls
- Minimum 24" x 21" side hinged service window or sliding window
 - Locking mechanism
 - One-way security glass (ballistic resistant)
 - 14" wide ledge, minimum 3' long, on both administrative side and foyer side of window
 - Built-in cabinet with shelves below ledge on administrative side of window
 - Service window should open 180 degrees toward administrative side so it is flush with wall when open or slide appropriately
 - 1 duplex outlet under counter on administrative side
 - Adequate lighting for processing written transactions above counter
- 3' wide door to administrative area
 - Solid core metal-clad door
 - Minimum 16 gauge metal
 - Minimum 1 ¾ inches thick
- Cipher lock with heavy duty electric strike (scramble pad preferred)
- Minimum of 1 duplex outlet
- Buzzer/intercom
 - Master unit in administrative area
 - Slave unit outside main entrance (beneath overhang)

BATHROOMS/SHOWER

DCSS Dover requires separate male/female bathroom and shower facilities.

- Individual fiberglass shower stall enclosure
 - Liquid soap dispenser installed
- Elongated toilet in stall
- Hand sink with hot and cold water mixed
 - Vanity underneath sink
- Hot water heater for shower and hand washing
- Quiet exhaust fan
- Non-slip ceramic tile floor
- Ceramic tile on lower part of walls
- Drain in floor near shower
- Washable painted gypsum walls or vinyl wall covering above tile
- Minimum STC rating of 45 between bathrooms and adjacent office spaces
- Glass mirror over sink
 - Minimum 18" wide x 30" high
 - GFCI outlet near mirror
 - Light over mirror
- Coat hooks on wall near shower
- Recessed or semi-recessed paper towel dispenser and trash can installed near sink
- Recessed or semi-recessed liquid soap dispenser installed over sink

BREAK ROOM/AREA

Provides space for couriers to take a break from work activities. This room accommodates soda and/or candy machines, refrigerator, microwave oven, and coffee bar.

- Tile floors
- Suspended ceiling
- Painted gypsum walls
- 4-plex outlets every 6', minimum of 2 outlets on each wall
- Minimum 10' long counter with cabinets below counter
 - 3 sets of GFCI duplex outlets above counter
 - Kitchen type sink built into counter

GENERAL STORAGE CLOSET

Areas for storage of janitorial supplies and equipment, computer supplies, and administrative supplies. General storage room should be near the administrative office.

- Built-in shelves along 1 wall
- Shelves 18" height o.c.
- Shelves 24" deep

COMMUNICATIONS SUPPORT

- Wire for Defense Information Systems Network (DISN) and Local Area Network (LAN) interface
 - LAN connections for 1 server, 4 computers, 4 printers (drops to be in design drawings)
- Wire for telephones, intercom and fax connections
 - 4 telephone lines (1-CC Office, 2-admin, 1- fax) for facility (DSN and commercial capability)
- CAT 5 cable for LAN and phone lines with three drops at each location
 - Drops in office, admin area, SCIF, and throughout the courier workstation area (drops to be in design drawings)
- 1- SIPRNET line connectivity required
- Terminate lines in utility closet with cross-connects to server/base LAN/base telephone system
- Connect system to base LAN

SECURITY EQUIPMENT CLOSED CIRCUIT TELEVISION

Coverage for all exterior penetrations (doors, windows, etc.). Additional guidance is found in DCSI 2000.1 Annex E. Equipment should be compatible with host installation standards such that routine and emergency maintenance can be provided by the host installation.

- Equipment includes cameras, camera mounts, motorized zoom lens, pan/tilt enclosures, weatherproofing, and monitors inside SCIF and admin area.
- Control system
 - Screen splitter/insertor or multi-plexer (displays signals from more than one camera on one monitor)
 - Lens controller for motorized lens
 - Pan /tilt controller with random scan
 - Operational with either 115V/60HZ AC or 24 DC power

ACCESS CONTROL SYSTEM

Stand alone electronic control system to provide positive access control and the resulting audit trail. Panel shall be compatible with host installation standards such that routine and emergency maintenance can be provided by the host installation.

- Digital scrambling keypad
- Electronic locking device
- 24V DC electromagnetic lock and power supply
 - Meets or exceeds 1550 pounds of holding force
 - Fail-safe with no moving parts
- Microprocessor based controller board with metal enclosure
- Internal Power supply
- Standby battery (6 hours of use)
- Relay outputs
- Access code database
- Event transaction buffer
- Serial communications interface and all necessary communication cables
- Serial dot matrix printer
- Power supply operational with 115V/60HZ AC
- Scramble pad at door separating customer service vestibule from admin area and at SCIF pedestrian entry

INTRUSION DETECTION SYSTEM

Must meet standards of DCID 6/9 for SCIF. IDS also required in Administrative Area. System shall be compatible with host installation standards such that routine and emergency maintenance can be provided by the host installation. Additional guidance is found in DCSI 2000.1 Annex E.

- Class 1 digital encryption system (DES) line supervision
- Capability of real-time event logging
- Compatible with fiber optic telephone line systems
- Provide multi-level noise immunity, electrical transient suppression and the use of unconditioned, electrical ground isolated signal/telephone lines
- Use on-board modems for communications
- Automated resynchronization of the secured area premise control
- Duress switches for secure area (one for each entrance into SCIF including roll-up doors and pedestrian doors) and customer service entrance (behind customer service counter)
- Passive infrared/ultrasonic sensors for volumetric coverage of secure areas
- High security balanced magnetic switches (triple biased) for roll-up doors and vault door
- Capacitance grid for any HVAC or penetrations over 90 square inches
- Standby battery (6 hours)
- Receiver console and monitor rack for annunciation point
- Individual alarm annunciation
- Line conditioner for secured area and annunciation point
- Power supply operational with 115V/60HZ AC

**MISCELLANEOUS CRITERIA
INSIDE STATION**

- Night light/emergency circuit for 1 panel minimum in each room (at least 2 panels in vault)
- All walls (other than in vault) should be painted drywall, unless specifically identified otherwise
- General lighting should be fluorescent, flush with plastic diffuser covers
- Lights mounted so that diffuser covers are flush with ceiling
- Heating/ventilation/air conditioning with adequate air exchange
- Ventilation to prevent infiltration of fuel vapors and exhaust fumes from the vault and flight line in to administrative areas
- System should provide constant ventilation even when heating/cooling are not required
- SCIF should have cooling to the same standard as an administrative facility
- Separate controls for vault and administrative areas
- Automatic sprinkler system with audible alarm throughout facility
- Space for clothes closet with clothes rod and shelf or clothes rack
- Minimize number of windows (Additional guidance found in DCSI 2000.1 Annex E)
- Do not locate utility closets or other maintenance service areas in the SCIF

OUTSIDE STATION

- Service ramp and/or loading dock to roll-up door—mechanism shall be compatible with AMC Freight Terminal pallet handling equipment. One roll-up door is required. As applicable:
 - Ramp to roll-up door to be of appropriate slope and non-skid (refer to appropriate regulations for slope requirements)
 - Loading dock to have dock leveling device to accommodate different heights of trucks.
- If front entrance to facility exposed to weather elements, awning over customer service door
- Automatic start emergency generator for back-up power
 - Automatic transfer of power
 - Capability to power alarms, cipher locks, lights and environmental systems
- Flood lights above vault door
 - High pressure sodium
- Light over personnel door
 - Incandescent
- Doorbell/buzzer outside primary entrance
- Lighted parking area and driveway
- Adequate parking
 - Spaces for assigned personnel
 - Spaces for DCS GOV's close to the vault
 - Spaces for customers close to the customer service entrance
- Driveway access for forklifts and delivery vehicles

SPACE REQUIREMENTS

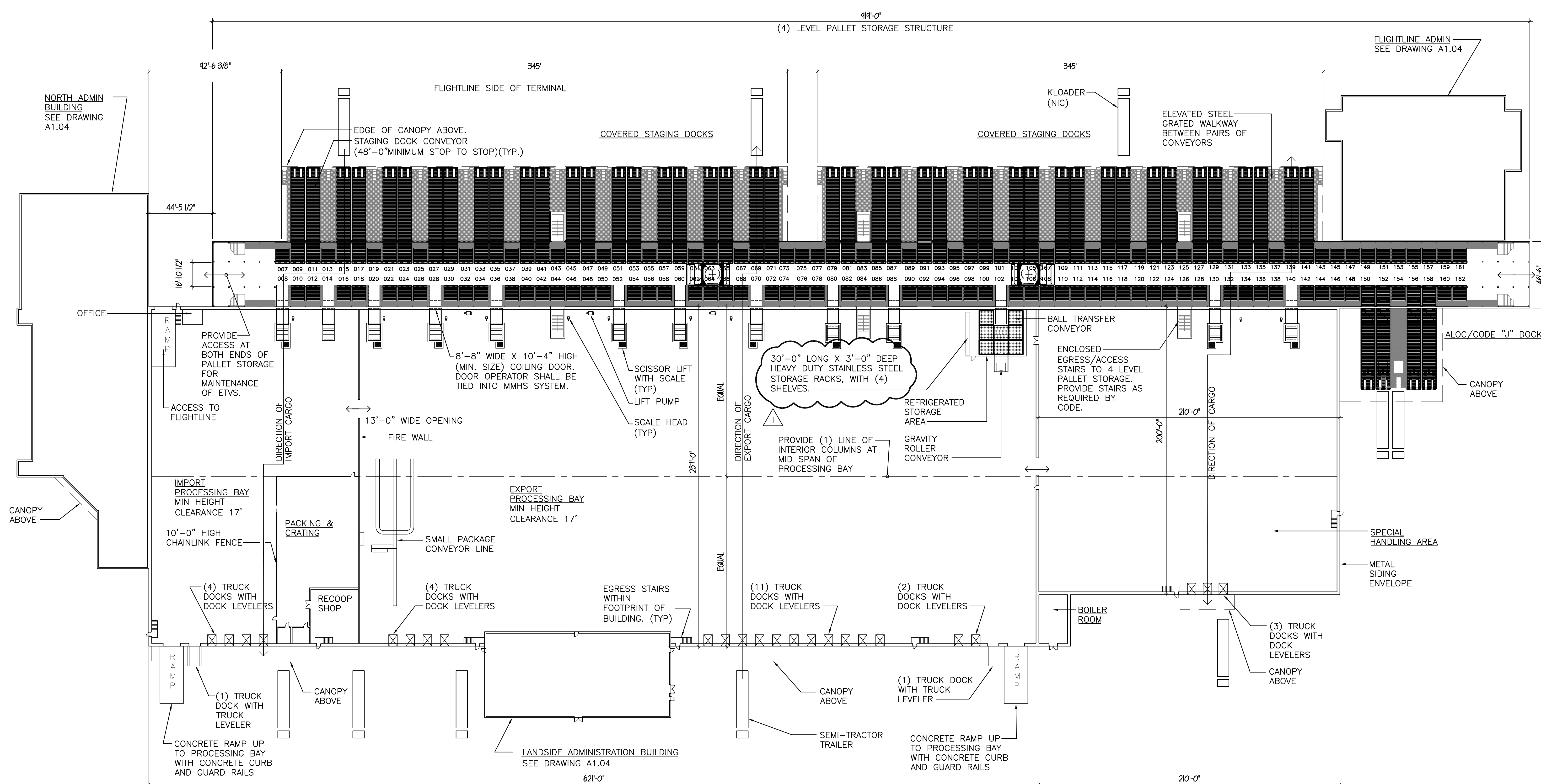
These are approximate space requirements for the standard DCS station. The actual size of each room should be tailored to a specific station using this criterion as a guide. Not included below is space for a mechanical room, hallways, and telephone panel closet.

<u>FUNCTION</u>	<u>(SQFT)</u>
SCIF	(1100)
Administration (4 work areas + ops area+ office space+Break area)	(820)
Computer Room	(150)
Customer Service Vestibule	(120)
Lockers/Shower	(50)
General Storage Closet	(160)
Total	(2400)

Rev.	Date	By	Description
1	2/13/04	BLF	ADDED DIMENSIONS TO REFRIGERATED STORAGE BAYS - AMENDMENT 15

Rev.	Date	By	Description
1	2/13/04	BLF	ADDED DIMENSIONS TO REFRIGERATED STORAGE BAYS - AMENDMENT 15

U.S. ARMY ENGINEER DISTRICT, PHILADELPHIA
CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
WFW
WITNESS
FOR RECORD
BY
DATE
1/3/04
1/3/04

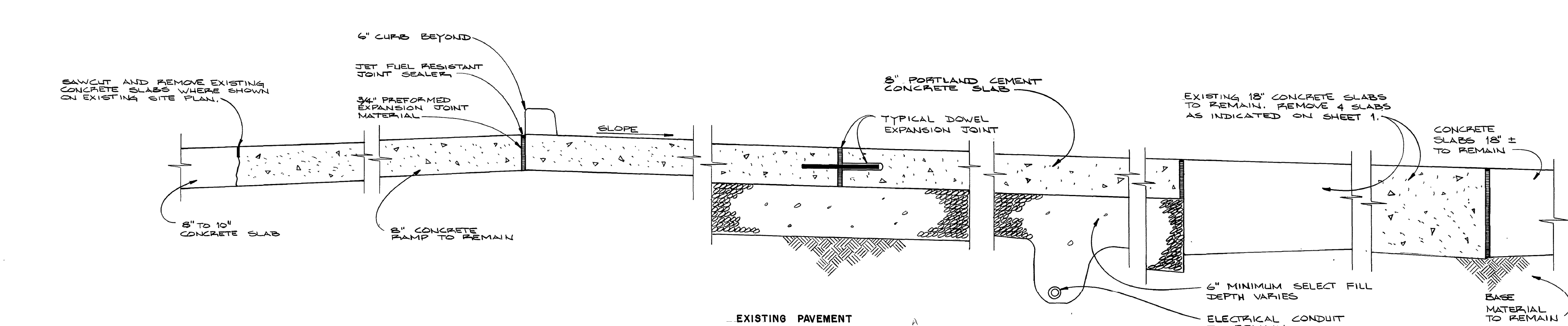


PROJECT NORTH
MAIN AFT BUILDING-
FIRST FLOOR PLAN
1/32" = 1'-0"

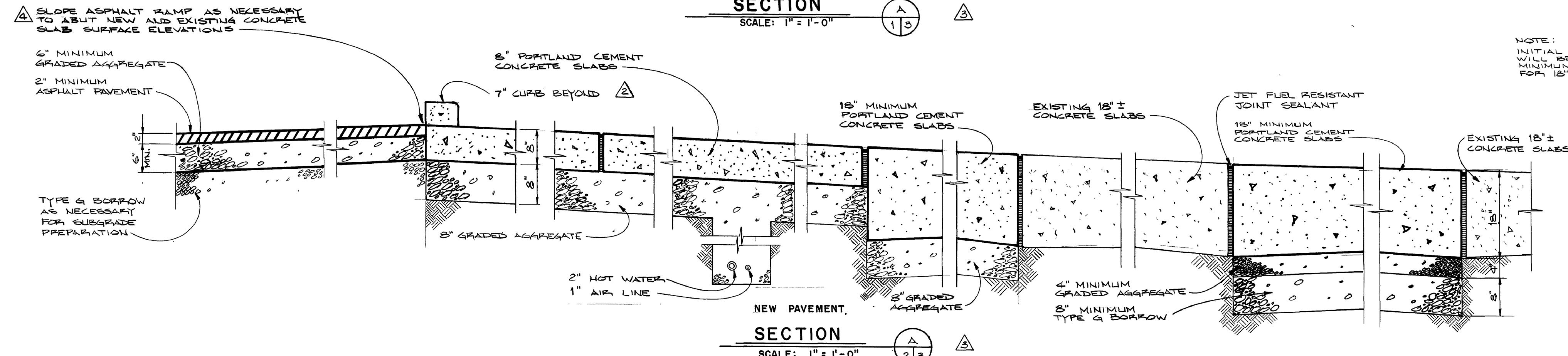
0 16' 32' 64'
SCALE: 1/32" = 1'-0"

1. ALL FLUORESCENT FIXTURES NOT MARKED ARE TYPE 'FF' MOUNTED EL. 45'-5" (20'-0" A.F.F.)
2. FOR FIXTURE SCHEDULE SEE PLATE #73
3. NIGHT LIGHTS ARE MARKED "NL".

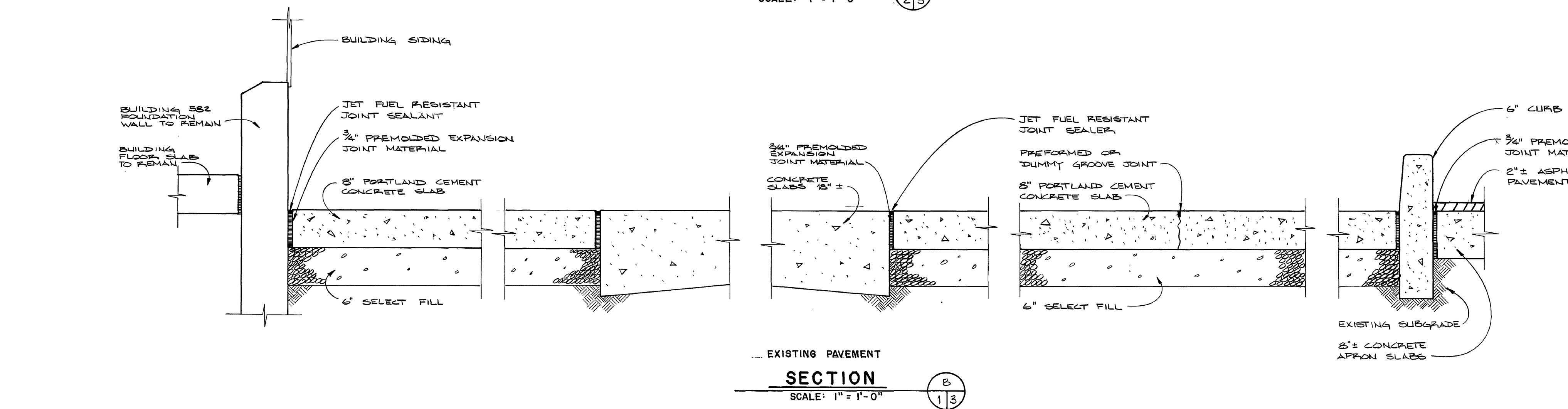
APD	△	MAY 83	WD *63019	INSTALL NEW MODULAR OFFICE	JAR
		Apr 74	AS Constructed		EGH
NPRD	REV	DATE	DESCRIPTION		BY
(A3)	DEPARTMENT OF THE ARMY BALTIMORE DISTRICT, CORPS OF ENGINEERS BALTIMORE, MARYLAND				
(B.B)	DOVER AIR FORCE BASE , DELAWARE AIR FREIGHT TERMINAL				
(D4)	LIGHTING PLAN GROUND FLOOR - SHEET #2				
DORTCHEX INCORPORATED ARCHITECT -- ENGINEERS STAMFORD, CONNECTICUT			DRAWING NUMBER AS-BLTAW-36-43-02		PLATE 80
SCALE: 1/32" = 1'-0" 11			DATE: 5/12/71		SHEET 80 OF 97



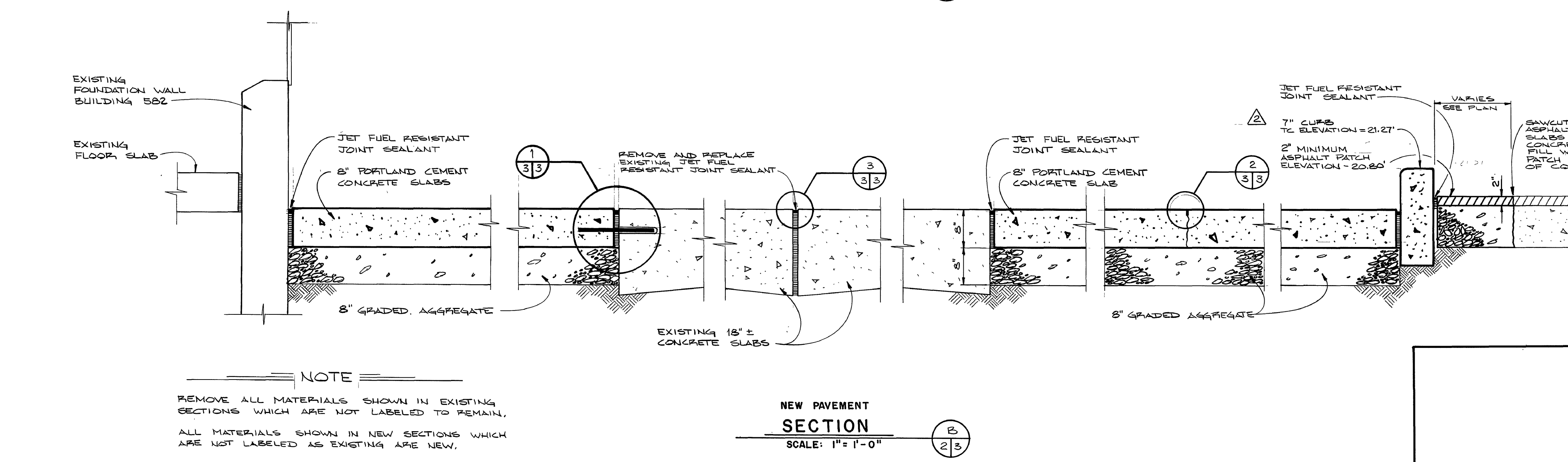
SECTION A-A
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SECTION B-B
SCALE: 1" = 1'-0"

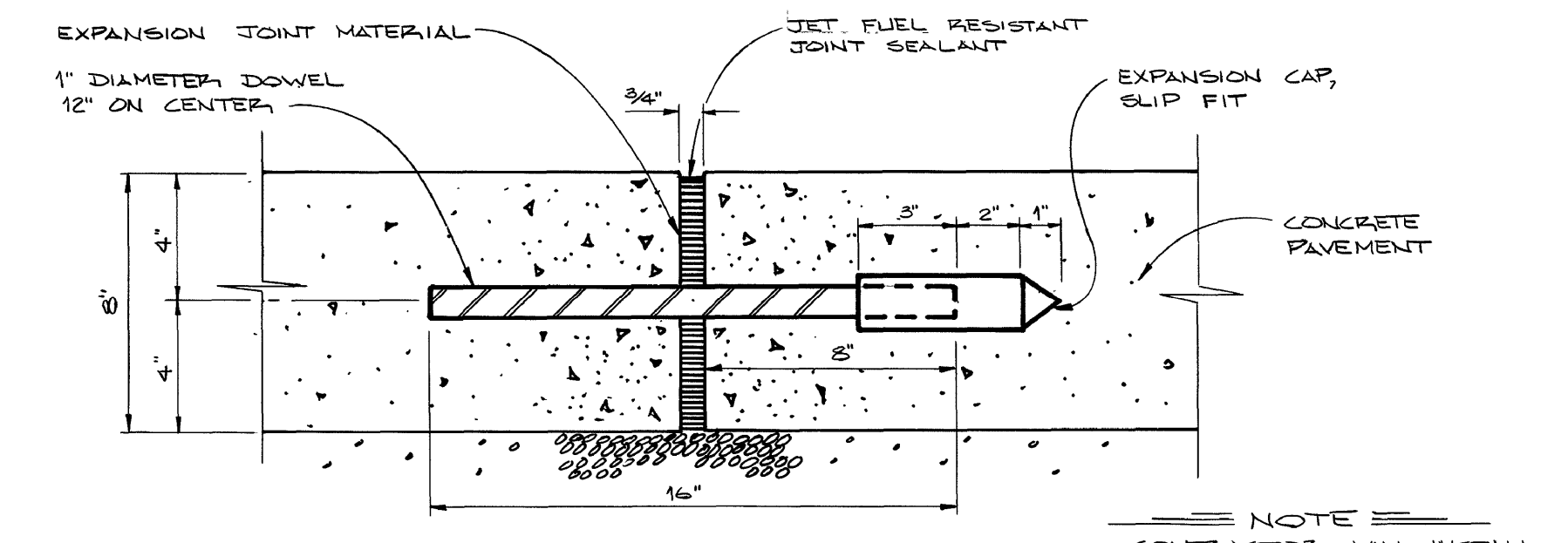


SECTION C-C
SCALE: 1" = 1'-0"

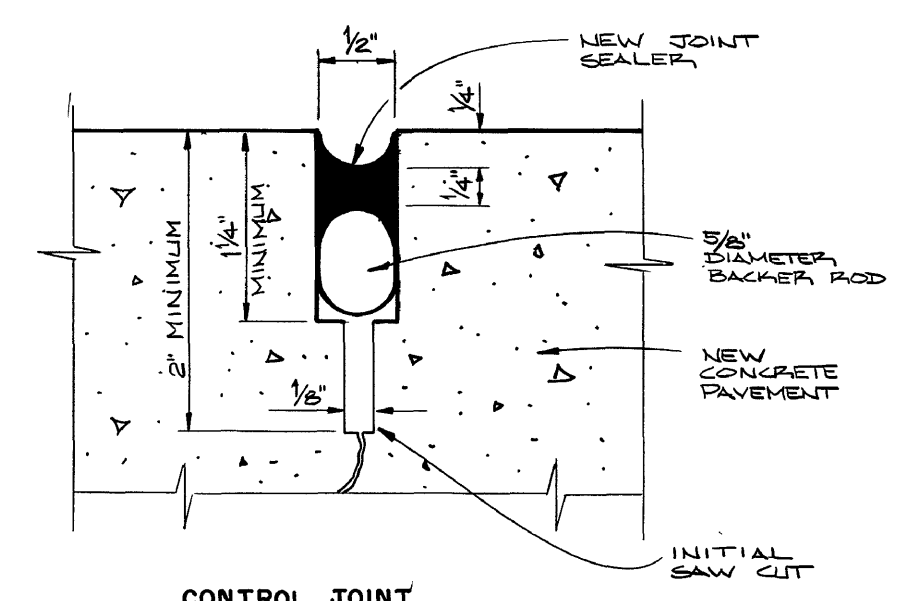


SECTION D-D
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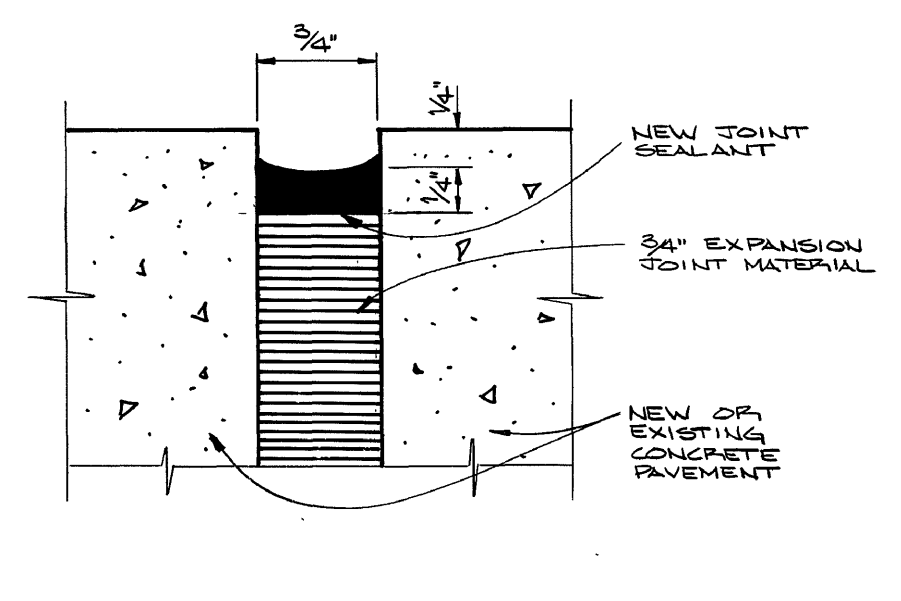
NOTE
REMOVE ALL MATERIALS SHOWN IN EXISTING SECTIONS WHICH ARE NOT LABELED TO REMAIN.
ALL MATERIALS SHOWN IN NEW SECTIONS WHICH ARE NOT LABELED AS EXISTING ARE NEW.



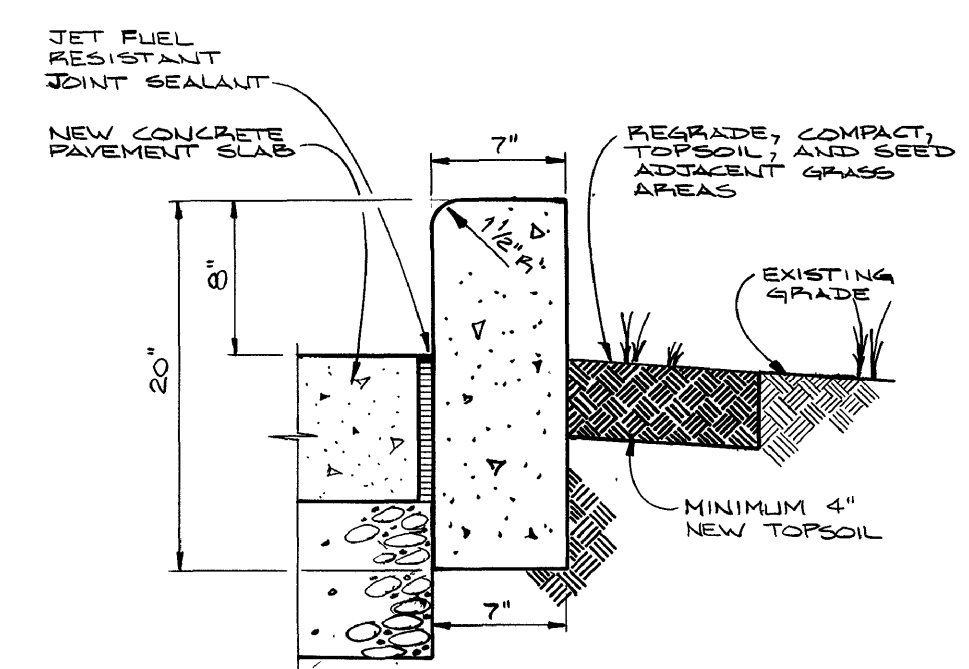
DETAIL 1
SCALE: 3/4" = 1'-0"



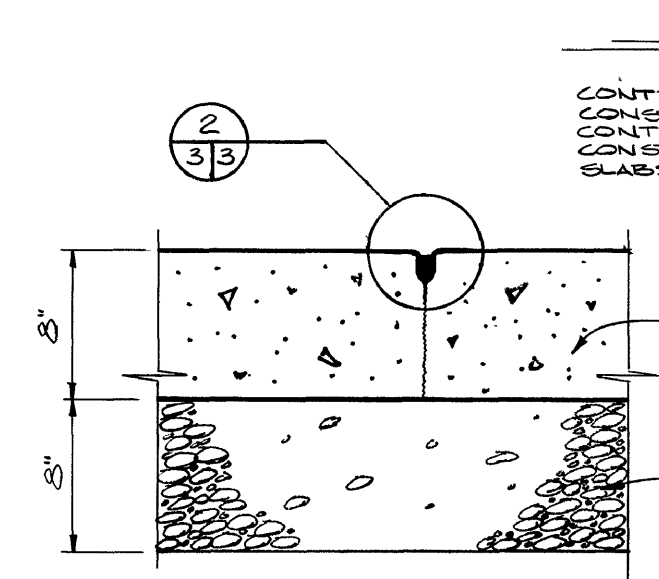
DETAIL 2
SCALE: FULL SIZE



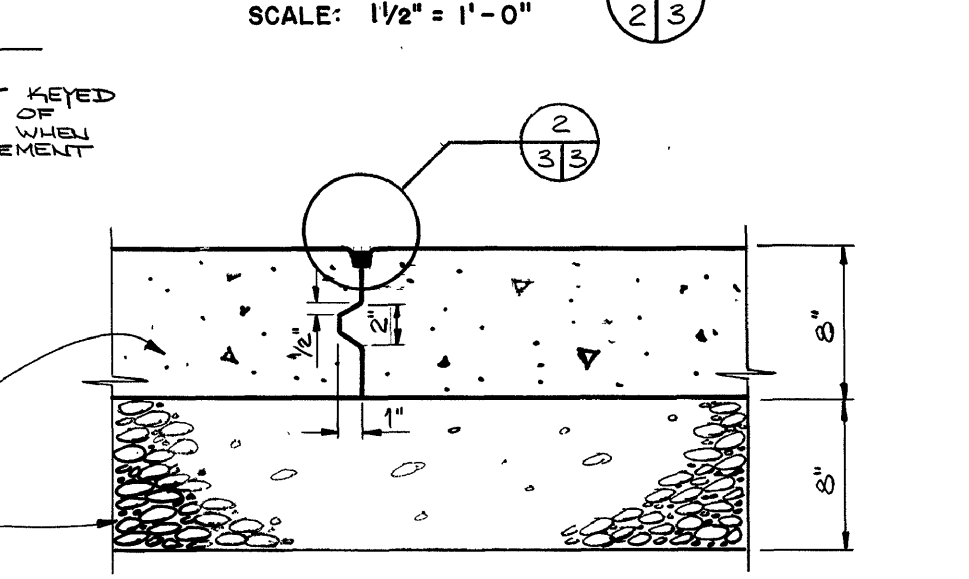
DETAIL 3
SCALE: FULL SIZE



NEW CURB SECTION
SCALE: 1 1/2" = 1'-0"



TYPICAL CONTROL JOINT SECTION
SCALE: 1 1/2" = 1'-0"



TYPICAL KEYED CONSTRUCTION JOINT SECTION
SCALE: 1 1/2" = 1'-0"

ISSUED FOR CONSTRUCTION

CHIEF DEM	CHIEF DEEC	REV	DATE	DESCRIPTION	DRAWN	APPROD
CHIEF ENGR.DESIGN	FIRE CHIEF					
SECURITY POLICE	SAFETY					
POLLUTION CONT ENG	BIO-ENVIRONMENTAL ENG					
CORROSION ENG	USING AGENCY					
PROTECTIVE COATING	BASE COMMUNICATIONS					

MILITARY AIRLIFT COMMAND DOVER AIR FORCE BASE, DELAWARE		
ALTER/REPAIR WASHRACK		
EXISTING AND NEW SECTIONS AND DETAILS		
SUBMITTED	APPROVED	APPROVED
CHIEF ENGINEER	CIVIL ENGINEER	COMMANDER
DRAWN BY R.H. STILL	DESIGNED BY R.H. STILL	DATE JUN 89
SCALE AS SHOWN	PROJECT NO 891006	DRAWING NO W-4308